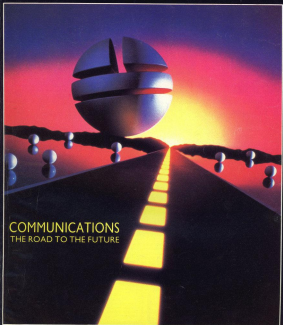


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REPTON 3

THE ULTIMATE CHALLENGE

3



The Screen Editor



The Character Editor



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by a monster



The time bomb
is scored



The Poisonous Fungus
grows instantly



Collecting a
golden crown

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Our original Repton game was immediately acclaimed as a contrastingly new concept: a game requiring steadily to complete its arcade-style puzzles, and clever logic-thinking to solve its strategic puzzles. Repton 3 creates a totally new concept from cleverly combined logic of falling walls whilst avoiding the tediousness of monsters and hounding traps. This is an unending game reaching new heights in BBC-micro adventures, enthused the Micro User magazine.

Last Christmas saw the release of Repton 2, larger and much more challenging than before. Acorn User's Technical Editor Bruce Smith wrote: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant".

Now completely rewritten and improved for the Commodore, Amstrad, BBC Micro and Electron, we proudly present Repton 3. For the first time, a screen-editor is included: try to devise screens that will perplex your friends, then see if you can solve their newly-designed screens. Another innovation is the character-designer which enables you to design your own monsters, rocks, eggs, spirits, diamonds... any or all of the game's characters can be redefined as you wish.

Repton 3 is much larger than its predecessors — it has 32 fascinating screens and players who are skillful enough to complete them all can enter our prize competition described below. All the favourite Repton characters have been retained, together with several new features: creeping poisonous fungus which grows at an alarming rate; time bombs and time capsules (for puzzles in the 8th dimension); and golden crowns (a well-deserved reward for your endeavour). **Can YOU complete Repton 3?**

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DATA STATEMENTS

People on Chips

Judge Dredd is just one of the cinematic characters being launched on computer at the moment. Melbourne House has set him up in Mega City 1 which is a metropolis teeming with dangerous criminals. You must track down unsolved crimes from glam apartment blocks to the city streets, to the deadly chaotic Undercity where the sins of the 20th century still stand.

As well as the violent criminals, there are Robodogs: ancient guard machines escaped from their storage bunkers and running free. Scavalers are tiny robotic rats left over from the apocalypse war. And then are the rats and brutal subhuman Undercity dwellers in the lower regions of the city.

The only certain things are your judge's training and your lovely language paired with its supply of words, high explosive, armoured

piercing heat-seeking bullets. It's for the C64 and is £9.95 on cassette and £12.95 on disk.

Firelord is a new C64 arcade adventure from Henson. Set in the medieval land of Torus, the intrepid Firelord must save the land from the evil queen using fire power, skill and cunning. The queen has tricked the dragons into parting with the firestones and is terrorising the people with deadly fireballs. It's priced at £9.95 on cassette and £14.95 on disk.

Twinkl

Melbourne House: 80 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4QE. Tel: 01 81 943 2658.

Melbourne: 268 Midway Trading Estate, Milton, Abingdon, Oxon OX14 4RE. Tel: 0225 652918.

In On The Act

Activision is releasing a bundle of Commodore titles to see you through those long winter evenings.

Tas Times in Town, has you in pursuit of your missing grandfather who disappeared leaving a cryptic message and a receipt for an anchovy and pepperoni pizza. Your quest takes you on an intra-dimensional vacation in Townsville, an ultra-touch village filled with the latest assortment of slushers, droids and taxi cabs. You have two objectives: find gumpies and get tax because if you can't you'll be booted out of Townsville. All sounds very confusing. The only way to see the light is to play it. It's £19.99 on C64/128 disk.

Labyrinth is the computer game of the Jim Henson film starring David Bowie.

In a world of magic and mystery you'll meet such characters as the Fireies, Ludo, Hoggle and Sir Didymus. You are a captive in a world of twisting mazes and corridors. You only have 15 hours to unlock the secrets of the *Labyrinth* or you'll be enslaved for ever. It's available on the C64 at £9.99.

Shogun is a strategy challenge game based on the ancient Chinese

board game of Mah Jengg. It's available for the C64 at £14.99 on disk. The rules are deceptively simple. From 144 randomised picture tiles of seven different suits, players snap off matching pairs until they run out of moves. The tiles are stacked in the shape of a dragon ready for battle and players can only match tiles from the dragon's head or tail. It involves thinking as many as 20 moves in advance. There are four different options from *Shogun* to a game in which any number of players can take part.

Altered the Deal, brought to life on the movie screen is now starring in his own computer game. On a remote volcanic island, Howard must try and rescue his friends from the dark overlord. Obstacle and enemies on his quest include fighting the rapids, battling the mutants and making his way to the thrilling finale. Aids to his journey are a jet-pack, his quack-its skills, an altitude and a laser. It's on the C64 at £9.99 cassette and £14.99 disk.

Twinkl

Activision: 21 Pond Street, Hampton, London NW3 2PN. Tel: 01 811 1191.



Lots of Aristocraft

Five sessions of the rapping public, Aristocraft is bringing out a whole selection of ball and main games to keep you happy during the season of good cheer and beyond.



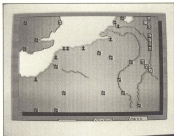
Zaxxon is a space arcade game set in a zone of the galaxy which doesn't obey any natural laws. This zone leads into an area of Crazy Space. As an undergraduate at Marsport University you have been detailed off to find out what exists at the apex of the cone shaped Crazy space.

Summed up by the words about 'em up with great music!

It's for the C64 and costs £9.95 on cassette and £14.95 disk.

Another very arcade game for the C64 is *Mountain Man's Death Role*.

D A T A S T A T E M E N T S



Mick is a Canadian Mountie and for some reason he's dodging his way along the top of the Trans-Canadian Express. Keep your head and keep shooting is the helpful hint from Articsoft. It's \$8.99 for the C64.

Warrior: Silent War is another honest to goodness, no nonsense, head-down, mindless shoot out game. This time you're a cornered gangster, fighting for your life in an old dusty warehouse. The cassette version for the C64 is \$9.95, disk will cost \$14.95.

There's also *Blitzkrieg* which will take you back to the action packed days of World War II. Based on the Len Deighton book of the same name,

you are in command of the German forces and must attempt to invade England using the Blitzkrieg strategy.

Special features include: Menu driven pop up file system, has relief graphics, historically and geographically accurate, scrolling 3D terrain, real time movement, pop up message windows. The game is available for the C64 and is \$9.95 on cassette and \$14.95 on disk.

Touchline
Articsoft: 68 Long Ave, Croydon, London WC2E 8AY. Tel: 01 836 3471.

C64 and Plus/4 News

Damark's controversial *Spide Persuader* game is now available for the Plus/4. It's a computer age jigsaw in which you have to assemble pictures of the rich and famous within a frame which can hold traps. There are lots of distractions to make you lose concentration but they could help you too.

Character featured are Margaret Thatcher with Denis, Ronald Reagan and computer industry figures such as Alan Sugar of Amstrad and the irreverable Clive Sinclair.

The new Plus/4 version costs £8.95.

Brilligade is a new C16 Plus/4 release from Amco. Amco promises to have you glued to your joystick with

the fast action bidirectional action.

You have been chosen from thousands of soldiers to join an elite marine unit being trained to complete a mission impossible. Your task is to secure the bridgehead. There are eight sections to complete, each of which is heavily patrolled. Your ammunition is limited so you must raid enemy dumps to replenish your supply.

Touchline
Damark: 104 Warple Road, Wimbeldon, London SW20 8PN. Tel: 01 847 3412.
Amco: 15 West Rd, Basingford, Rom. Tel: 0212 825458.

Communicating

From early December, Prestel Subscribers will be able to access Telecom Gold - British Telecom's electronic mail system. This follows the creation of a new X.25-based gateway link between the two services. This is the first stage in establishing full interconnection between the two networks.

The new link incorporates software that enables information sent on a 'wording' ASCII type terminal to be formatted in a Prestel page style.

Additional features include text editing prior to transmission and simpler screens with a single gateway frame for each Telecom Gold system which takes the user straight to an ID entry point. Prestel customers wishing to access Gold will be routed from the Prestel messaging database.

As all members of Microsoft are also in Prestel, this new facility is also available to them.

Touchline
Prestel Headquarters: Telephone House, Temple Ave, London EC4Y 8AL. Tel: 01 422 1876.

Bumper Bargains

Compilations are always popular at this time of year and US Gold has brought out a Show 'em Up collection for the C64. There are four games on the cassette the names of which will no doubt be familiar: *Exorcise, Exorcise, Blue Max and Fort Apollonopolis*. All four games can be had for £9.99 on one cassette.

Boss Jolly, a software house which specialises in compilations has recently released *Computer Hits 3*. Included on the tape are *Gruff Capes Strongman Challenge, Muggle Guts in Hollywood, Elton, 3D Locomark, Crazy Carrots, Dynamic Dan, Herbert's Swamp Run, Attack of the Mummy Camels* and lastly, *The Adventures of Bond - Rastaban Bond*.

All the games have been released in their own right previously. The compilation is a two cassette set.

Touchline
US Gold: Unit 2/3 Midford Way, Redford, Birmingham B4 7AR. Tel: 01 256 1388.
Boss Jolly: 284 Bell Street, Brighton, Surrey BN2 3AB. Tel: 071372 22601.

DATA STATEMENTS

Hits and Phizzes

Infogrames, the French games company, has a new product out, *Bridge* for the C64. It is not a game for bridge beginners but is aimed at the experienced player.

It incorporates the seven conventions recognised by most players as well as 99,999 pre-programmed deals. Other features include a scoreboard, a cheat screen, replay deal function and a facility to deal specific cards to certain players.

Also from Infogrames is an arcade adventure called *Orc*. It takes place in a babysitting arena where Alfred has been sent to look after little Valentin. Valentin is an incredibly annoying child and runs off, leaving Alfred to find his way around an enormous house and cope with all the hazards

that this involves.

Marsen is releasing a C64 game based on the ever-popular BBC soap opera *Eastenders*. It will feature all your favourite characters, and the not so favourite ones and will be out soon, so keep your eyes peeled.

The Sparklen range of £1.99 budget games is being expanded with two new games for the C64. *River Rescue* is a watery simulation of a dangerous river in which you have to negotiate such hazards as river mines and drownings in an attempt to guide your motor launch into a safe haven.

Monkey Mania features a half man/half monkey creature who is searching for the holy scriptures and having to fend off enemies with lightning bolts.



Adventure Creations

Incentive Software has now launched a new label to cater for games written with the successful *Graphic Adventure Creator*.

Winter Wonderland is the first of two new releases on the new label. It's an adventure set in the Himalayas and you must locate a lost civilisation which is apparently running parallel to your own but independently. The adventure begins with a plane crash and over the civilisation has been located your attempts to escape back to normality begin. Just released, it's £1.95 on the C64.



The Sporting Armchair

Software companies are always trying to make sports simulations more life-like. New New Concepts has come up with the idea of a surfing game in which you attach a mini surfboard to your keyboard and learn surfing techniques with the palm of your hand. *Surfchamps* is the game, and it has been endorsed by the British Surfing Association as a game which teaches the sport in the authorised way.

Back to more run-of-the-mill sports, with another martial arts offering from Melbourne House. *Fist II* is the sequel to *The Way of the Exploding Fist*. Once more the Warriors of the Exploding Fist must combat evil with their fighting skills. The skills are difficult to acquire and are come by in two ways: experience and from the secret scrolls. Described by Melbourne House as arcade, adventure strategy, simulation and much more, it's out on the C64 at £9.95.

For those who like a little more variety than US Gold/Epsa has just launched *World Games*. Featuring such motley events as slalom skiing, roller racing, barrel jumping, cliff diving and much more. Sorry no welly throwing.

It's out now and costs £9.99 on C64 cassette and £14.99 on disk.

Timeline

New Concepts: 17 Dublin Street, Carlow, Ireland. Tel: 076339 3262.

Melbourne House: 68 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4HS. Tel: 01 843 3811.

US Gold: Unit 2/3 Hedford Way, Hedford, Birmingham, B5 7AE. Tel: 021 356 3388.

The other release on the Medallion label is *Apocalypse Gold* in which you battle against the people and circumstances in the wild west. It's also £7.95 on the C64.

Both these games are winners of the Gold Medallion award, presented by Incentive for the best games produced using the GAC which has recently topped the worldwide £1 million sales mark.

Timeline

Incentive: 54 London Street, Reading, Berks RG1 4SQ. Tel: 0734 38652.

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SIDEWAYS

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Comms for Beginners

Everyone has heard of computer communications but a lot of people find this a bewildering subject. Our guide will explain the basics and show you how to get started.

By David Janda

Communications has been the most popular trend in computing for the past two years, and judging by the sales of modems and such like, it would appear that more and more people are getting involved in this very exciting aspect of new technology.

Computer communications, or 'comms' is a very broad subject. It covers everything from getting your micro connected up to a modem to extracting information from the many online databases - and that's a lot.

One of the first questions I get asked about comms is 'why bother?' Well, comms is informative, fast and free! You could use computer communications to get online to one of the many voluntarily public bulletin boards that are in operation in this country and abroad. Alternatively you could subscribe to one of the growing number of electronic magazines that are becoming available. Business users might prefer to subscribe to one of the many electronic mail services that allow you to send and receive information world wide, instantly at the touch of a button.

What you get out of comms all depends on what you want, and are using. Casual chat-chat is often to be found on the bulletin boards, while the commercial services such as Micronet and Compuport offer technical, entertaining and educational services. Business users can definitely benefit from comms. It has been said that information is power, and those who get the information first have the edge. Comms enable you to

do this by accessing one of the many commercial services that provide information covering diverse subjects ranging from weather forecasts to stocks and shares.

One thing is certain. The best method of getting to grips with computer communications is by giving it a try yourself. This article can only point you in the right direction, the rest is up to you.

The Nuts and Bolts

The biggest hurdle in understanding comms is getting your micro connected to the phone system (PTSN

- Public Telephone Switched Network). The obstacles in your way are connecting the micro to a modem, selecting some comms software and trying to understand the jargon blanch of it unless) that surrounds the subject.

Luckily enough for us Commodore owners the Commodore 64/128/128D is well equipped to communicate with the outside world.

All computers represent information in a digital manner, as a series of on and offs, ones and zeros. Not only that, but information is transferred internally within the micro in a parallel manner - normally eight 'bits' at a time. Unfortunately to communicate with another micro (the telephone



100

Which Modem?

After deciding how you want to connect your micro to the modem - cartridge or interface - you need the modem itself.

This will be your critical purchase, as you can pay as little as £30 or as much as £80. Before buying a modem you need to decide in advance whether you will use it on a regular basis or just casually. Different modems communicate at different speeds and generally speaking the faster it can operate the more it will cost. The advantage being the faster it can send and receive information the quicker you can get the information you want, and at today's rates for telephone charges that's an important factor to consider.

The range of speeds that modems operate at varies between each model, but the band rates, as they are known, are common. Typical speeds, or band rates include: 300/300, 1200/1200 (half-duplex) 1200/75, 75/1200. The more expensive models can operate at 1200/1200 full-duplex and even 2400/2400 as is the case with the Pace Series Four 2400s.

The basic-term half-duplex and full-duplex mean that data can only be transferred one way at any given time in the case of half-duplex, and both ways simultaneously with full duplex. Modems which offer 1200/1200 half-duplex normally require some special software that switches between sending and receiving, and is normally only used when transferring information between two people, often referred to as user-to-user. In the case of 1200/75 band the computer you call will transmit information to your micro at 1200 band full-duplex whilst your computer will transmit at 75-band. To get these band rates into perspective a general rule of thumb can be used by dividing the band rate by 10 to get the number of characters of information per second. So 1200 band roughly means that 120 characters of information will be transferred each second.

Most modems operate at dual band rates i.e. they can operate at a number of speeds. Typically this would be 300/300, 1200/75 and 1200/1200 half-duplex. Most services operate at specific speeds, and as a general rule the following applies:

Bulletin boards - 300/300, some also at 1200/75

Videodata services - 1200/75

Electronic mail - 300/300, 1200/1200 (full), some 1200/75

Looking at the above list you can see that the type of service you use should be taken into account when you purchase a modem. If, for example you wish to access Videodata services such as Microsoft/Prodata then it is essential that your modem is capable of operating at 1200/75 band. On the other hand, if you wish to use the electronic mail (E-mail) or online databases then it is best to purchase a modem that can operate at 1200/1200 full-duplex as this is four times faster than the 300 band models and it will enable you to send and receive information more rapidly thus saving time and telephone charges.

Some modems are supplied with an auto-dial option enabling the telephone number to be entered on the keyboard rather than manually dialed. Auto answerer options will do just that - automatically answer the phone upon an incoming call. Other more exotic features are auto handshakes which enables the modem to automatically set itself to the correct baud-rate when the host system has been connected to. This saves a lot of knob twiddling on the user's part. The up-market range of modems even allow frequently dialed numbers to be stored internally as well as complete control via software.

Connecting the modem to the telephone line requires one of the new BT jack sockets (model 600 telephone socket) to be fitted near the area in which the modem is to be used. If the modem is fitted with a telephone socket then the handset is connected to the modem and the modem to the wall socket. If this is not the case then it will be necessary to install two wall sockets (one for the modem and the other for the handset) or use a splitter.

Whatever modem you choose make sure it is BART approved. This is established by checking for a green approval sticker which will have an approval number on it. Use of equipment that is not approved is currently an offence.

Choosing the Right Software

Currently there are two common software standards in use in the UK; scrolling and videodata. Basically speaking scrolling software displays only characters in one colour with the

text scrolling as more information is sent/received. Videodata displays pages of information in colour with low resolution graphics.

Each type of standard merits its own features and there are certain items which you should look out for when buying a communications package on disk, tape or cartridge.

Scrolling software (also known as dumb terminal) should allow baud rates to be set by the user. It should operate in half or full-duplex mode and accept all the common ASCII control codes including BEL, ASCII 7. Also check that the software will enable you to specify between ASCII and PETASCII. Some means of saving incoming data in ASCII format should be available, and ideally a facility enabling the user to prepare test messages offline should also be provided.

Because the PTSM was not designed for computer errors in the transmitted data often occur. To prevent this the length of the data word can be set (usually to eight bits). Other features including start and stop bits as well as parity should also be user selectable. However, even with parity and stop bits set up the error checking is very much a half-way house. Errors will still occasionally creep in and this can be a problem when transmitting files. An error checking protocol called MODEM (also known as MODUM) is very common in communications packages and it allows text and program files to be transferred error free. This is accomplished by sending the file in small blocks. Should a block be corrupted during transfer the receiving end will detect the error and automatically request the packet again.

Other features to look out for are an online dial which is useful for keeping track of how long you have been online. Split screen operation divides the screen into two parts with the upper part of the screen used for displaying incoming data while the lower two or three lines at the bottom are used for user input which will be transmitted. This feature is especially useful when playing online adventures such as MUD (Multi User Dungeon), or when using an online CD simulator. Of particular use is a dictionary in which you can store frequently used numbers on disk as well as the parameters for the particular service (word length, parity etc). When used with an auto-

dial modem it enables you to select a service by pressing a key. This will dial the modem and set up the software appropriately.

The videotext standard is radically different to the scrolling type of software. Although videotext systems operate at 1200/1200 baud an option to set the speed to a different baud rate is particularly handy as *Protext* which is the largest videotext system in the UK will soon introduce multiple baud rates including 300/300, 1200/1200 full-duplex operation. Also of particular use is a 'reverse Print' rate of 75/1200. In this mode your computer acts as if it were *Protext* and the caller would call your number as if they were using *Protext*.

Features to look out for in all *Protext* packages include page refresh for when data becomes corrupted, a previous page facility and some means of tagging pages. Frame tagging allows the software to remember particular pages that can be recalled at the press of a button. An option to save a frame to disk is also essential.

A major feature of most videotext systems is telesoftware. Basically telesoftware is software that can be downloaded and saved to disk or tape. For the Commodore range of micros a special telesoftware downloader format has been developed by Mirosoft called Muntag. This is the standard for all videotext telesoftware for the Commodore machines and is found in many packages. Readers are advised not to purchase videotext software that doesn't have a downloader of the Muntag variety.

One other feature worth looking out for is an offline mailbox option. This enables you to prepare mailboxes offline and then send them when logged on.

It's worth noting that some packages that incorporate both types of standard are bound to lack some of the features mentioned above due to lack of available memory.

A final note about software selection. There are literally hundreds of pieces of communications software for the Commodore range of micros available in the public domain. In other words free. These can usually be obtained from user groups or clubs such as ACPUG or C&A 64.

What's Out There?

The number and type of services avail-

able is almost unlimited. Remember, computer communications know no boundary and it is just as easy to dial up a bulletin board in Australia as it is to dial one locally. However, the types of service available can roughly be split into three categories; bulletin boards, databases and Email systems.

Bulletin Boards

These were amongst the first services in this country. Basically a bulletin board is what the name suggests; a public bulletin board, except electronic. The BB is a special piece of software which runs automatically on the micro. They are of the scrolling type and normally operate at 300 baud full-duplex. The BBs are run by enthusiasts in their own time, and allow one person to use the board at any, given time for about 15-20 minutes. A board will offer an electronic mail system as well as a public messaging service. Other features to be found on BBs include special interest groups (SIGs) which are areas on the board dedicated to one particular subject such as computing, fishing or whatever. A large number of BBs offer free software which can be downloaded in either ASCII or XMODEM format. The good thing about BBs is that there is no charge of fees to log on to and they are not run with commercial interest in mind. Not only that but they are only a phone call away!

Databases

These are commercial ventures and usually require you to subscribe before access is permitted. Subscription charges differ from service to service and are also governed by the type of information they provide. Hobbyist/ Home DBs such as *Mirosoft* and *Compuart* offer the micro user a wealth of information and software - some of which is free. These DBs also offer other type of value added services such as a private mailbox for each subscriber as well as interactive games and public messaging facilities. In the case of *Mirosoft/Protext* the service is of the videotext standard while on the other hand *Compuart* operates on its own protocol.

The DBs which are aimed towards the business sector tend to be of the scrolling format and are rather expensive to subscribe to. Information

supplied depends on the individual DB and this can include references to publications, share prices, legal cases, refereeing and so-on. Many offer very powerful search and cross reference facilities. This type of service is of particular use to the business user and those who are engaged in research.

Electronic Mail

Better known as Email systems. These are set up for the purpose of individuals to transfer information to others via the Email service. Again this type of service is usually of the scrolling type and is most common with a 1200/1200 full-duplex modem. Email systems such as *BT Gold*, *One-To-One* and *Starboard* offer very comprehensive message handling services as well as text, radio paging, references and so on. Most offer text orientated services such as spelling checkers, language translation services, mailbox preparation and such like. The distinction between DBs and Email systems is very blurred as the two tend to offer features that the other type has. Most Email systems are geared towards companies and individuals who have a lot of text they wish to transfer, however an increasing number of private individuals are now beginning to see the benefits of these services.

But Best of All

The best type of service is the one that you and your friends can provide yourself. User-to-user communication is great fun. Both you and a friend arrange that one dials another at a pre-determined time (and baud rate). The idea is not to kill the art of conversation (never talk to a terminal when you can talk to the person themselves) but to get used to the idea of communicating. U2U can also be used to transfer your own programs and text between each other and can be especially useful for making those emergency backups we all like to do now and then.

Whatever you do do in the coming weeks have fun!

David Janda can be reached on the following services: *Protext/Microart* 617374144, *One-To-One* 1349991, *Starboard* 7134 AG98387 and *Compuart* D. JANDA.

BB List

Here are the telephone numbers for

NAME	TELEPHONE	RATES
BADS I	0994 376306	300
Brixton Inc	01 735 5153	V/Data
Cashiflora	01223 464 715	V/Data
C-Vire	0702 346373	V/Data
FORB Systems	0792 333933	300
Gnome at Home	01 888 8894	V/Data
Hedley RI	01 985 3322	V/Data
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London RI	01 455 6667	300/12-75
London Underground	01 863 0098	300/1200-75
Mastel	01 341 1719	300
Multicos-80 (Liverpool)	051 425 8924	300/1200-75
Mutual	01 941 4385	V/Data
Norvic	0804 20441	V/Data
TRBS Blackford	0258 54494	300
TRBS London	01 348 9400	300/1200-75/1200-1200

some of the more popular BBS. V/Data in the rates column indicates that modem software will be needed to access the service.

Comms Software

Numerous packages are available for the Commodore 64/CIB/128D. Here is just a small selection of the more popular ones.

Mining - A windows package for use with the Commodore modem. Features itself as a downloader and offline mailroom editor as well as very good screen-chung routines. See October issue of *Your Commodore* for free offer to Compaq subscribers. Available on disk and cassette from: *Mining* 886, 278-3143. Price: £11.95 disk, £8.95 cassette.

V2 Mining 32 cartridge - Incorporates all the features of the above but also has dumb terminal software as well. Other features include auto-dial/answer detection and directory. A cable leading from the cartridge connects to the modem via an RS422 socket. Can also be used with IB software also available from V2 computing (£99.95 on VAT). Available from *Modem House*, (0952) 31335. Price £49.95.

HomeFax - Part of the HomeFax package from US outfit *Batteries Included* and sold over here by *ArchieSoft*. HomeFax requires an RS232C adapter to be fitted and operates at 300/300 and 1200/1200 full-duplex. The package also features XMODEM file transfer and a special graphics mode called *Video* that is used when on CompaqServe.

NOPE - There is a tremendous amount of free public domain comms software available for the Commodore series. Two very good sources are *ICP&G* and *CLUB 64*. Membership is £12 per year which includes three disks of software of your choice from their library.

Modems

Commodore Modem - Operates at 1200/75 and 1200/1200 full-duplex. Contains ROM software and editor specifically written for Compaq. Can also be used with wordling software (*word*) and *Mining* disk to get access to *Mining/Postal*. Price ranges from £25 to £79 for the same thing to shop around! Contact *Modem House* or *Compaq*.

Enterprise 1 & 2 - A superior version of the *Voyager* series. *Enterprise 1* offers 300/300 and 1200/75. *Enterprise 2* has features 1200/1200 full-duplex. Prices £114.95 inc VAT and £287.45 inc VAT respectively. Available from *Kirk Acoustics Ltd*.

Series Fax - This is a series of professional modems with just about everything you could ever want. Can be upgraded to a 2400/2400 fully buffered Hayes compatible modem with printer port. Prices start from £250, available from *Pace*.

Multimodem - Cartridge with internal software and modem. Plugs into the cartridge and load fits into telephone socket. Speeds include 300/300, 1200/75, 75/1200. Windows and wordling software. Price £98.50 exc. VAT. Available from *Microlink Technology*.

NOPE - Online services such as *Micromat* and *Compaq* have special deals on Modems for those who subscribe to their services for a whole year.

Online Services

Micromat 800 - £16.50 per quarter gets you access to *Micromat* as well as the rest of *Postal*. Features include mailbox, chatlines, MUD, software etc. Soon to have a link to *Pelican Gold*. Special features include local call access and free usage in evenings and at weekends.

Compaq - Database dedicated to Commodore 64 and C128 owners. Bags of free software to download including games, music etc. Need Commodore modem to access it. Special features include *AT&T*, *Partyline*. Three tier subscription.

Microlink - A database within a database. Operates part of *Telcom Gold*. *Microlink* is the cheapest way of getting onto a dedicated Email system that also offers online databases as well. Besides all of Gold's features there is a special area just for *Microlink* subscribers. Special features include *Telemessages*, *Trics*, *Email*, bulletin board and a US link to *Minimania DB in USA*. One off fee of £3 plus £3 monthly minimum.

NOPE - There are quite a few 'hidden costs' involved when using the above mentioned services and readers are advised to request written details of all charges before subscribing.

Telnetlines

Temple: Telephone House, Temple Ave, London EC4A 3DL. Tel: 832 3132
Micromat: 800/88, London EC1R 3ET. Tel: 81 758 3442
ICP&G Membership Secretary, 28 Chancery Road, Newbury Park, Oxford, Ox4 0JZ. Tel: 840 80 80
Upper Beaconsfield Road, Bubb's 9, Oxford. Tel: 840 80 80
Enterprise: St Peter St, Ipswich IP1 1AB. Tel: 0457 336141
Batteries Included: Europa House, 60 Clarendon Road, Macclesfield, Cheshire SK2 3AT. Tel: 091 429 8082
Commodore UK: 7 Watney Road, Holton, Corby, Northants NN17 1QE. Tel: 0338 393333
Pace: Tel: 8274 485231
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Club 128

*Plug in your 128, connect up your modem and read on
for the latest news from Compunet.*

By Neil Day

As people who saw the Commodore modems going down like oiled systems at the Independent Compunet Club Stall at the Manchester Show will understand why some people are remembering that the system has been under a bit of strain over the last few weeks. The free modem offer has attracted a lot of new subscribers, and an expanded user base can only be good news for all of us in the long run. In the short term, however, the system has been labouring a bit more heavily than usual at certain times.

Night-eats hardly notice any difference, and on a Sunday mid-morning to lunchtime session I found it very fast indeed. However, it is appreciably slower sometimes, especially in the evening. When demand has increased on previous occasions, Compunet has been brought back up to speed pretty quickly. Let's hope that things are whittling along again by the time you read this.

Updates

Gravelling apologies are offered for several frames that have been mentioned in earlier articles and have either lapsed or been moved between the time of writing this column and its publication. The problem is inherent in trying to use paper and ink to keep up with a fast moving computer data base. Now Commodore has very obligingly let me use their area, (GOTO YRCBIM) to upload a series of CLUB 128 UPDATES. These will bring the latest news on the whereabouts of these wandering frames.

Please check it a couple of days after this article appears.

Club 128 Index

In a previous Club 128 column I mentioned indexes and directory frames.



Recently a new service has started which will be of particular interest to Club 128 owners. At frame 171215, J28 News Update, you should see an upload by PJM81. It is called 128 Yellows Index and contains a list of Club 128 programs available off Compunet. PJM81 requests anyone who uploads a Club 128 program to courier him with its location for inclusion in his list. If there is sufficient interest, he will continue the service which is an excellent one. A few nice votes wouldn't go amiss either in encouraging this worthy service!

Characteristics

An easy-to-use character editor called "Charred" is available free of charge at frame 301574. This nifty little utility modifies letters from the 128 character set and can relocate them in memory. It shows you the results of your labours on the screen as you work. I am a bit dim about things graphical ("visually illiterate" is the usual diagnosis) so I was puzzled to find my screen filling up with hundreds of quiet dots and specks while I was modifying a character. It looked as if the monitor had a terminal case of chicken pox! The dots got bigger and

bigger as I added more pixels to the character I was currently defining. After pondering this for an embarrassingly long time, I finally realised that I was modifying character number 32, the space. This is the code for the characters on the blank bits of the screen!

The author, LAFL, does a little professional programming and has written some entertaining educational programs mainly targeted for preschoolers. GOTO EDUC and DAN the frame titled PRISMCHOCOL (183947). There are charges for these programs.

Mach II

Four Commodore readers will remember the Mach Assembler which was published in the magazine. As I write, this program is still available in the Year Commodore directory (GOTO YRCBIM and DIR "Software"). SC1 has been working on an updated version called the Machine Language Development System (MLDS). This is available for 12 at frame 26944. The new version has several extended features and is not upwardly compatible with the Mach Assembler.

In comparison with other assembler and monitor packages it is



very attractively priced and offers a good way for learners to start off with machine code. But be warned that the instructions are not intended for beginners. My own favorite machine-

yourself machine language book is by Jim Butterfield: *Machine Language for the Commodore 64 and other Commodore Computers*, published by Prentice Hall, ISBN 0-89800-650-8.

Magazine Reviews

Finally, a bare-faced plug for a directory I jointly edit with RIMSI: C6410 MACS will take you to a series of short reviews and notes about items in computer magazines that bear on Commodore machines. RIMSI does the useful work: he covers the main magazines from the US, and provides a very welcome service as it is often hard to find these in the shops. We also try to review the serious British magazines, and focus more applications and programming than on games. If you see a magazine, or even an item in a magazine that you think could be of interest to other Clubbers, drop me a mailbox with a description and I will upload it.

Remember that Cloning is like sea writing, you never know what you'll haul in until you try. If you find something likely to be of interest, to Club 128 users, please contact me (Neil Day NAD12).

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Sense of Adventure

Adventures are still pouring out of the software houses and boggling the minds of fans. Your Commodore brings some much needed aid.

by Pete Freebrey

Tetanium is an American software house which is only now making any appreciable headway in this country. The software is not cheap but usually offers something different from regular adventure games found on the shelves. Only disk based versions are available and the three that I have come across are *Amazon*, *Nine Princes in Amber* and *Perry Mason - The Case of the Mendocino Murder*.

Amazon is based on a plot written by science fiction author, Michael Crichton, who is better known for his novels *The Andromeda Strain* and *The Terminal Man*. The game starts with the destruction of an archaeological team in the Amazon jungle. This same team was to have investigated the lost city of Chak, where it was thought they might find a new form of amiraid.

This type of amiraid is particularly important in various hi-tech applications concerning national defence. This explains the involvement of National Satellite Resource Technology (NSRT), a top secret, research and consulting firm. You play an operative for this organisation, who was to be sent out to the doomed expedition.

Immediately after the communication confirming that something is terribly wrong, you are sent on a one man mission to sort things out.

The game comes on two disks - both double sided - so expect a lengthy operation. Unlike many conventional adventure games, *Amazon* does not require extensive mapping to ensure you know where you are. It is very much like a paperback novel, you start at the beginning and work your way through page by page to the end.

The game revolves around puzzles that have to be answered before any further progress can be made. There

are a few 'side roads', but you are invariably forced back to the 'main road' to continue to the next puzzle. There are several pages of instructions and background information, including a map, a list of words understood by the parser and a coded help sheet.

Playing the game involves extensive use of the disk drive, with many inputs causing it to whirr away for seconds at a time. Although the disk access is not particularly slow, this enforced waiting can become a bit of a bore at times. At the beginning of the game you are reminded to create a 'save disk', on which you can save up to 15 game positions - do this at the earliest opportunity!

The introductory sequence takes six minutes and is interesting the first time round but you will not want to wait through this each time you 'die' or make a silly mistake! Things start in the NSRT control room where a video link reveals the expedition's demise. You are called up to your controller's office to be briefed.

Among other things, he will ask

you to spell out your name. Take care, later in the game you may be asked your name - misspell it, even by substituting lower case letters for upper case, and you will be accused as an imposter and will have to start again!

As soon as you leave his office, make your first game save. From then on it's up to you, but this save will eliminate those initial six minutes. You will be given some extra equipment before you board a plane at the start of your assignment, check the contents carefully.

Your first task is to pick up some helpful information from a Professor Becker in Miami, unfortunately he is killed before you can talk to him. Nevertheless, you do get some help in the form of Poco, the Professor's parrot. This talking creature is a fund of knowledge and can often give you a clue when you are in a tight spot!

In due course you are parachuted into the Amazon jungle and have to report back to NSRT via your computer/transmitter. This room enables headquarters to keep track of your location and on several occasions they will guide you out of trouble by giving you map references to aim for.

Switching on your computer changes the normal graphics picture of where you are, to what is presumably the computer's display. You must enter your security code before NSRT will complete the connection, you made a note of this didn't you! Having completed transmission, the computer display clears - taking 10 seconds to do so, much!

At one point you have to locate a roving band of monkeys who have stolen your backpack. Use of a joystick is recommended but this seems a little out of context and is



more of a nuisance than a challenge.

Altogether this game is an interesting attempt at trying to create something a little out of the ordinary. The basic story line is good, with reasonable graphics - which may be switched off to speed the game up - and the game could well be recommended to beginners but might prove too slow and predictable for the more experienced adventurer.

Red Hawk?

Millennium House's latest adventure, *Redhawk*, is a game with a difference. The graphics are in the form of a scrolling comic strip, which makes sense, as the game is about *Redhawk*, a comic type superhero.

At the start of the game, Kevin Oliver, the normal human side of *Redhawk*, finds himself in hospital suffering from amnesia. Whether or not he had some previous existence we are not to know but now he is searching for a job as a crime photographer. Having got him settled in his new job you may aim him into whatever adventures come along.

Having lost any previous memories, you lose the choice of making him act as either superhero or supervillain. *Redhawk's* popularity rating, shown graphically beneath the comic strip, will affect the interaction of the other characters. To find out what the heck is going on, it seems best to choose hero rather than villain.

SAY (or SHOUT) "KWAH!" (with quotes), and our Key will change into the fearless *Redhawk*. He is able to fly and has most of the powers claimed for superheroes. The main snag is that as *Redhawk*, his energy output is high and his reserve of power fairly low! So a return to being plain Kevin is very necessary after only a few minutes.

Location descriptions are almost non-existent as they are all included within the 'comic strip' shown at the top of the screen. This strip has three frames that scroll across the screen from right to left at each command. You would think that this would show the present and two previous scenes but this is not so.

Each command, if understood, is repeated by the Kevin in the strip and only then actioned - two frames for one command. This would not be so bad if the frames were drawn quickly but they are not, this is quite painful if all you want to do is go from location A to location B, it is more time having

to wait for the frame to be drawn to be told: "Kevin looks for a way north but can't find one!"

The game is played in real time with a digital clock taking away the seconds as you wonder what to do next. Fortunately the clock is stopped if Kevin does not understand what you are trying to get him to do. Unfortunately this seems to happen all too often, his knowledge of 'normal' 'adventure talk' is sadly lacking.

His inability to understand the command OPEN DOOR brought up the response "open" confuses Kevin. He does seem to be a very confused young man. Another change from normal practice is the use of EXAMINE, here it literally means a body search, perhaps it was not surprising that a young lady I met early in the game, objected quite strongly when I told Kevin to examine her!

For all its differences to normal 'adventure speak', Kevin will understand fairly complex sentences with multiple commands separated by commas also accepted. A number of common commands are shown at the bottom of the screen and are accessed by CTRL and one of the number keys. The game has a STORE facility (a version of RAIDSAVE) with a normal tape save/load to ensure for saving your position between games.

Overall *Redhawk* is rather disappointing and boringly slow when you consider the lack of text and rather repetitive graphics. The game puzzles are good with the feeling that something is right is just around the corner but the lack of any real atmosphere destroys what could have been a really good adventure.



The French connection

Intelligence is a new name in this country, and it looks as though it may be based of a great deal more in the future. The first offering is an adventure, *Mandragora*. This is best compared with *Golden Unicorn IV*, with a handful of intergalactic adventures exploring a strange land and the castles and villages they find in their travels.

This French variant comes with a fairly long background story to set the scene for the adventure. The good and just King Jordan has been killed in suspicious circumstances and his lands taken over by the evil Yarned-Nin. It is the task of would-be adventurers to search out and find the means by which to overthrow this reign of evil.

Mandragora is on two cassettes or one disk and is pretty large, with only 37 blocks used on the disk. A further formatted disk or blank tape is required if you wish to save your party's progress for use on your next visit.

On loading the game you are given the choice of starting from scratch and forming a party of your own choice, continuing with a previous adventure or using a ready formed party under the leadership of a female Paladin, Spolia.

If you are new to the game it is probably wise to use the ready formed party. This will enable you to get some idea of what the game is about, how it works and also which characters are best at what. Initially death comes quickly and your first explorations will be over quite rapidly, but, hopefully you will have learnt something useful before all four characters have looked over.

If you choose to start with your own party, you must first create the four characters who will make up the group. For each member you have to apportion 80 points (minimum five, maximum 20) to six attributes - Constitution, Strength, Knowledge, Wisdom, Dexterity and Appearance. For Knowledge add Intelligence, for Appearance, Charm or Charisma.

You must give the characters a name (up to ten letters) and define their sex. Five different races are possible - Human, Dwarf, Hobbit, Elf or Mole (Mighty One!) but there is no information as to the effect of this choice. There are six different character types - Warrior, Ranger, Wizard, Cleric, Thief and Minstrel. This choice is not entirely open as each of the last five

must have over 14 points given to them in their primary attribute - Ranger, Sergeant, Wizard, Knowledge, Cleric, Wizard etc. Any character may be a Warrior (press key '5', soldier?)

Your final choice is the character's colour, this helps differentiate characters of the same type when they are shown graphically during the adventure. Once a team has been created - save it to disk or tape. Creating a team is not a long process but it is certainly not something you will want to repeat if someone dies in the first few minutes of play!

You start in the wilds, north west of a village and west of one of the Chateaux (its a French game, remember!). Your team is depicted by a single figure that may be moved around the scrolling countryside with direction keys N, E, S, W. There are various terrains to be explored - plains, forests, hills and swamps, all of which are possible. There are also areas of water where you will need a boat to get across and finally mountains that are impassable.

There are a number of villages where you can buy or steal items that you may need, all villages appear to be the same when you get inside but that does not make them any the less welcome. There are 10 chateaux, one of which contains the evil Varned-blee but the other nine must be visited and their powers solved to help you complete your quest.

On entering other villages or chateaux, the display changes from a general plan view to a limited 3D picture. This shows you that location, the members of your party and any objects or creatures present. To the right of this picture is a brief status of your characters, their experience and life points. Also shown is a list of visible objects or creatures. A maximum of four things can be seen at any location with each being coded A-D.

The function keys F1-F4 will display a full status report on each of your four characters, including any attributes, food or money held by them. Each character may only carry four objects and the full status report will give each of these a number (1-4). You must remember which number refers to what, as Mandygore gives a novel input routine that requires the player to type in commands in a highly abbreviated form.

Each character has a number (1-4) and the 28 verbs that are understood

are recognised by either one or two letter abbreviations. This can be confusing at first but once mastered, enables commands to be issued very quickly. I BU C will display on the screen as SYRELLA BUYS MEDICINE, the machine being object 'C' shown at that location.

Several verbs support two objects, so, J AT A 2 concerns to TORLENN ATTACKS HARRY WITH SWORD - this is why you must remember the in TorleNN's inventory, item '2' is a sword!

As your party moves around the 'map' of Mandygore, they will be attacked by a variety of wandering monsters. With the less experience points the characters start with, this can be fatal. Experience is gained for most, successfully completed actions - disarming deadly traps, opening gates, finding treasure and of course defeating the enemy monsters.

Damage to any member of the team either from an attacking monster or a bloody trap, will cause a loss of 'life points', zero points and that person is dead. Fortunately, in each village is a supply of very beneficial medicine - not expensive and should be taken by everyone at regular intervals! One slightly annoying point is that once a member has bought an item from a village shop - it cannot be bought again without leaving the village and re-entering. Having stocks of medicine can take several minutes as you'll not be in and out.

Life points may also be replenished by eating or drinking. Food may be bought in the villages but the command is strange - SYRELLA BAKTERS 9, will get her 9 units of food for a cost of 18 units of money. In a number of locations within the chateaux you can find something to HUNT - rabbits for instance. These too can be eaten to replenish lost points!

If you have a well experienced Thief in the party you can raise your party's funds to almost any level providing you have the patience to keep popping in and out of a village stealing something and then handing it over to another member of the party to sell. This latter action is necessary, as, if caught, all objects, money, food and some life points are taken from the thief as a punishment.

Although you can TAKE many of the things you will find in the chateaux, you cannot drop them

somewhere and retrieve them later - they are gone for good. Also the word 'drop' is not understood (DRG is used for DRINK) you must use the command word LAY instead!

The characters may talk (ASK) to many of the things they meet in the chateaux. The responses are brief and usually give some form of cryptic clue about the puzzles to come. Other commands include OPEN, BREAK, SHOOT, READ. Not all commands are successful at first, so if in doubt - try again, perhaps using a different person. '!' will usually repeat the last command and can be a boon when fighting.

Once inside a village or chateau, it is possible to split your team up and control them independently. They could then theoretically each in place a different chateau or simply different rooms in the same chateau. There did not seem to be any valid reason for them to split up - but it is an interesting option, how about a multi-player game?

There are a number of special spells available to Wizards - LOOK, TELEPORT, SPELL, PARALYSE, HYPNOTISE and PETRIPE. I did not find these particularly vital and as they all use up some of the user's life points, I used them very infrequently. There may be special need for one or more of these commands, but if so I have not yet found it!

The pictures are fairly chunky block graphics that draw very quickly and although simplistic in outline, set the scene well for what is after all a fighting adventure with added puzzles. The puzzles are far from clear so do not expect to solve this game at once, two or three sittings. Many of the chateaux have creatures that MUST be fought before you can get to all the rooms. The diversity of these creatures is quite amazing, I do not think that I have ever come across a game with so many different monsters!

Do NOT type in HELP, this merely takes you back to the initial menu - if you have saved your game position, then you can return to that point otherwise you will have to start again!

An interesting game with a lot more to it than first meets the eye, not in the same league as *Ultima IV* or *Ultima VI* but nevertheless a good challenge, with some of the good points associated with role playing adventures in the 'D and D' tradition.

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Sentinel

*Can you escape the Sentinel's gaze?
Firebird challenges you to try with a mind
twisting game of hide and seek.*

By Eric Doyle

Sentinel is an oasis in a desert and every bit as refreshing. In a world where clone programs permeate the software industry it is a great relief that someone, somewhere can come up with a fresh idea.

The Sentinel is an evil despot who has conquered 16,000 worlds but there comes a time when the worm turns. In this case the 'worm' takes the form of a synthoid robot with a novel mode of travelling.

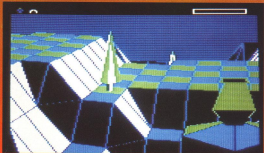
The robot projects an empty shell to the next place it wishes to occupy and then teleports itself into its new position. To conserve energy the synthoid can then re-absorb the old shell which allows another shell to be produced further along its route.

The Sentinel's planets have deep valleys cutting their way through mountainous terrain, all displayed in tremendous 3D. Normally the Sentinel occupies the highest point on the landscape. Every few seconds the Sentinel will rotate to face a new direction as it searches for a sign of the synthoid. A full rotation takes 12 such moves and was beside the synthoid who talks under the Sentinel's gaze.

Meanwhile, down in the valleys the synthoid seems to have a problem. A new shell can only be projected if the



robot can see the surface which it will be placed on. To raise its position the synthoid can create a boulder, or a stack of boulders, and then place the shell on top. This enables the robot to climb out of the deepest of gullies in its search for the Sentinel.



Should the Sentinel spot the synthead as it travels about the land, the synthead will detect the scan which precedes a final draining of its energy. At this point evasive action should be taken as quickly as possible by throwing out another shell. The old shell will have to be absorbed as soon as possible because the Sentinel will continue to drain its energy away and the shell will gradually change as it loses power. First it becomes a boulder and then it becomes a tree before finally disappearing altogether.

This shows the different energy levels. The basic currency is the tree. Two trees make a boulder, a boulder plus a tree makes a shell. As the robot moves around it will find more trees on the landscape to replenish any energy stolen by the Sentinel.

The principal rule is that energy can only be drained from an object if its basic can be seen by the robot. Anything on a higher level cannot be assimilated. For the Sentinel on its high plane this is rarely a problem but the synthead has to use its boulders to reach the trees on higher levels.

If the Sentinel can see its enemy but cannot see its base, the synthead's scan registers a 'half' charge. Although the synthead is safe for the moment, the Sentinel will metamorphose a nearby tree into a 'mini-tree'. This will scan around at a faster rate than its creator and, if it sees the synthead, it will hyperpace its fire to another part of the plane.

Hyperspacing, whether forced or deliberate, takes the same amount of energy as producing a shell (three trees). If the energy reserve is insufficient, the synthead will be destroyed.

The eventual aim of the synthead is to create a boulder platform which will raise it above the Sentinel so that its vulnerable base is revealed and the hunter becomes the hunted. Once the Sentinel has been drained of energy, a hyperspace jump will reveal the secret code which will allow access to one of the other 10,000 planets.

As the levels increase the game becomes more and more complex. The Sentinel is joined by an increasing number of Sentries who behave exactly as their controller but from less exalted heights. Before the Sentinel can be attacked in a final assault, all the Sentries must be wiped out. This really puts the player amongst the cats!

Combining so many skills, the game has everything going for it. The graphics are cleverly controlled, at times the gameplay is as fast as any arcade shoot-'em-up and yet the strategy element requires as much concentration as Chess. Sentinel deserves to be as big a hit as Firebird's classic Elite and in a similar way compresses a complex and sophisticated graphics style in a single load game.

Sentinel is a truly unique game and it deserves the accolade of being an essential addition to all C64 owners' collections.

Tweezer

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Playability: 9/10
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By A.E. Cadenas

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Contributions

*So you own a Commodore? So you've
written some programs? So why haven't you
sent them to us?*

Your Commodore is always on the look out for new programs, hints and tips, articles and even regular series. In fact if you have something that you think could be of use to other Commodore owners we want to hear about it.

So if you have got something which you think we may be interested in. How do you go about submitting it to us?

Below you will find a list of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.

2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.

3) On the very first page you should put the following:

Name of the article
Machine that it is for
Any extras required - disk, printer etc.
Your name
Your address
Your telephone number

4) The top of every page should have the following information on it:
Abbreviation of the article title
Your name
The page number

For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/J.Smith/1

5) Please make sure that you do not make any additional marks on your text especially underlining.

6) Try and write in clear concise English, it does not have to be a work of literature but it must be comprehensible.

7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.

8) If possible, enclose a listing of all programs.

9) Under no circumstances use a staple to hold the pages together. Use a paperclip instead.

10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.

11) Programs under 10 lines can be included in the text. If your program is longer than this you must enclose a disk or cassette.

12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

13) Photographs, if necessary, must be either black and white prints or colour slides. We can take shots ourselves so don't worry about this too much.

14) Submissions of any length are welcome. If you have a five line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.

15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £200.00.

16) All payments are made in the month that the magazine containing your article has appeared in print.

17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.

18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.

19) The last and most important point to make is 'get writing', we are waiting for your articles. [E]

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software getting harder....

Kids Stuff!

Mickey, Donald, Kermit and Gonzo all feature on US Gold's range of education games. But will you learn anything?

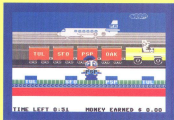
By Margaret Webb

This month's column is rather different in that it deals with a single software house—US Gold's Kids! No I don't have shares in US Gold, but in its way, this source of software has made quite a contribution to the software market for younger children.

One important feature to be appreciated is that educational software should be attractive so that it holds appeal to the user as well as delivering the information effectively. This is particularly germane to software for children in pre-school and primary age groups. Kids! software is mostly of American origin and uses Disney and other well known TV characters to help deliver its message. One drawback is that most of the packages require a disk drive in order to function. While disk drives are common in the states, this is not the case over here. Their American origin does have the advantage that they have that extra bit of panache that the American market demands. This also means that the graphics are to a high standard.

The first package is *Donald Duck's Playground*. This package doesn't set out to teach a particular skill but incorporates a number of features. The idea is to earn money which can be used to purchase items for the construction of an adventure playground for Donald Duck's nephews. The action centres around a street with various shops and other establishments on either side. You control Donald and can guide him into the building of your choice.

There are four money-earning activities to choose from, each testing different skills. At the airport, your child's ability to match simple sequences of letters is tested. The idea is to pick up packages and put them in the correct trolley ready for loading on the aircraft. You are paid for each package correctly sorted and things are made slightly tougher by an in-built time limit.



At the produce market, you must catch fruit being thrown from a lorry and put it in the correct box. Each time fruit is dropped, Donald gives off a string of quacked expletives in true style. In the toy store, you must collect toys and put them on the correct shelf. There is the added annoyance of frequent trains which shake toys off the shelves. Finally, you can work as controller on the Airpack railway. This involves the manipulation of points to direct the trains to the required destinations. This task is particularly tough.

Once you're amused enough money, you can go into the shops and buy ropes, ladders, wood and other junk and construct the playground. As the playground is built, you have the option of using the young ducks play on it.

The games cover such skills as letter recognition, matching shapes, speed of response, eye-hand co-ordination, forward planning and the handling of money during transactions. All games have three skill levels thereby catering for a wide age range.

Overall this is an attractive game which gives the impression of play rather than strict learning. Ideal for children from about six to 11.

Another play-oriented package is *The Great Gonzo in Hensonville*. This is a sort of takeoff of *Raiders of the Lost Ark* in which the heroic Gonzo (one of the Muppet's endowments to rescue Camilla the chicken from the evil grasp of the Swedish chef, Gonzo is equipped with a variety of exotic machines by Professor Henson Henslow at the Muppet Institute of Technology. With these devices, he must negotiate a range of hazards. The child must select the machine most appropriate for the hazard. For example, a diving machine is no use in New York City and a walking machine is no good for walking over the Eggplant Ocean (note the appalling pun used in the game!). You have a choice of flying, walking, climbing, diving, gliding and rolling machines and a range of attachments such as a catcher, light rubber and water sprayer.

To complete the game, the child must score a specified number of

points by negotiating the various hazards. The hazards are linked so that the game is rather like a long journey or quest. The problems are two-fold.

First the child must select the correct machine and attachment for the particular hazard, second, the child demonstrates the dexterity and timing needed to negotiate what are effectively a sequence of simple arcade games.

Once Canella has been rescued, you start again but with a higher points tally to achieve. Failure means a long trek by foot across the desert.

Overall the game is ideal for the younger child (six to 11 years) with its abundance of fun games and jokes, its simple arcade games and the use of word machines.

Once children start to read and recognise words, the next problem is to teach how words link together to give meaningful sentences. The problem is how to make this exercise fun. One effective approach to this problem is to get the child to write a sentence and then to read it back. *Arrow's Electronic Story Maker* provides a cartoon based method of writing simple stories. A particularly nice touch is that the program uses a joystick to make all selections via cycling menus.

The story is built up from a series of simple sentences of about half a dozen words. The display shows the sentence at the top of the screen as a series of blanks separated by punctuation marks. You simply point at each blank and choose from the words available. Each word is accompanied by an animated sequence showing what each word represents. An example sentence would be "While the banana dancers in space, the cow burks "Yes I know it sounds silly, but the program allows unlimited variations. Once the sentence is complete, you can see the sequence described. Once satisfied, you can then move on to another sentence. The sentences have differing



structures, allowing a fair degree of variety. Stories can be saved on disk for completion or replaying at a later date.

The sequences are nicely done with background music appropriate to the scene (all being based on the Muppet theme tune). The sound effects of the creatures/objects used are also rounded. Overall an excellent package which gives hours of fun.

The other two packages available are text/graphic adventures. First we have *Mickey's Space Adventure*. In this game, you assist Mickey Mouse and Pluto in their search of the solar system for a number of crystal pieces. The game is quite huge in that it occupies both sides of two disks.

In his travels, Mickey finds an alien space ship. This must be used to fly to the planets of the solar system to find the parts of the alienised crystal which holds the history of the alien planet. The game uses combined multicolour mode high resolution graphics with text. The pictures are true to the original Disney characters and are very colourful. The input of instructions has been simplified in that the options available are listed at the foot of the screen and you simply choose them using single key presses. The scenario is quite large with plenty of places to explore. Clues are also provided, particularly by the accompanying instructions.

On balance, the game is more suited to the older child (say nine to 12) since there is quite a lot of detailed information on the planets and other scientific topics. The accompanying literature is particularly strong with a glossary and ideas for further work. A disk drive is mandatory in order to play this game and the frequent disk changes are rather tedious. On the whole, however, this is a strong piece of software which will take quite some hours to solve. Additionally, each new game is different.

Winnie the Pooh in the Hundred Acre Wood is very similar in style to *Mickey's Space Adventure* albeit aimed at a slightly younger audience. The aim of the game is to locate objects and return them to their rightful owner. Naturally, each new game is different. To help players to play the game, a simple map is provided showing the main parts of the wood. This map bears illustrations which are similar to those shown on the screen allowing you to find out where you are. The game follows quite closely a number of events described in the original books and the illustrations are in themselves faithful to the original. As before, a simple method of selection of options is provided. There are also a number of abstract, fun options provided to allow the child to mess around. You can, for example, play Pooh sticks or look under rocks or count trees etc. There are also a number of confounding factors which can either move you to a random location or shuffle the objects around the wood. In all, just enough to keep a child quiet, or caring (depending on your child) for hours on end. Again, unfortunately, a disk drive is needed.

So what do we have? The packages can be summarised under several features:

- 1) All are colourful, well designed graphics featuring well known cartoon characters. They therefore have instant appeal, particularly to the under tens. Sound is also well used to give music and effects.
- 2) All packages come with detailed and colourful instructions. These instructions also provide ideas for further activities and, where needed, glossaries and detailed information.
- 3) Except for *Bonnie Duck's Playground*, a disk drive is required.
- 4) All packages teach and test skills without making it obvious. They also achieve their goals as educational packages. In all, the Kids series is filling a large gap in the software market for the primary age group and sets standards which many domestic software houses would do well to emulate.

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Timeline

Company: US GOLD/EMR
Address: Units 3/4, Halford Way,
Halford, Birmingham B6 7AF
Tel: 021 236 2288



Games Reviews

Weird, wonderful, zany or just plain fun. There are hosts of games just waiting for you out there, so we've brought you some to ease the burden of your decision.

KETTLE

Kettle is Tony Crowther's second game since resuming his partnership with Alligata. The First, Trap, was featured as Game of the Month. Kettle is unfortunately somewhat disappointing.

You play the part of a kettle (surprise, surprise) and are trapped in an underground complex of 50 different levels. Your objectives are survival and escape. The key to moving from one level to the next is to find a tin opener. This is hidden deep within one of the many levels scattered round the complex. At least I think that they are bowls. That is what they look like although the blurb insists on calling them bowls but I have a gut feeling that that is wrong somehow. Shoving the bowls 10 times results in it changing into a diamond and a further successful hit changes the diamond into an alien, a bonus, an energy giving jug of water or the much needed tin opener.

Shoving objects — bowls, bubbles and diamonds is done by use of action. This orbits around your kettle and behaves something like a cross between a South American bolao and a yo-yo. You can choose from the initial option screen how you want the critter to behave.

The most interesting part of the game is the fact that two players can play simultaneously. The screen is split so that you can watch exactly what your opponent is up to. Two distinct strategies present themselves. You can work as a partnership or you can play against each other, waiting for

the other player to do all the hard work before snipping in and stealing whatever the diamond happens to reveal.

The split screen works nicely but the main problem is that the game is just plain dull. Not one of Tony's better efforts. **G.R.H.**

Function:

Title: Kettle. **Company:** Alligata, 1 Orange St, Sheffield. **Machine:** C64. **Price:** £9.99. **Originality:** 0/10. **Graphics:** 2/10. **Playability:** 0/10. **Value:** 3/10.



UCHI MATA

After the plethora of karate and ninja combat games, it is a pleasure to see something a bit out of the ordinary. Such a game is Uchi Mata, a judo simulation. The name incidentally refers to one of the moves — an inner thigh throw.

Judo allows no kicks or punches. It involves gripping your opponent's judogi, catching him off balance and trying to throw him onto his back. How well you do this results in points being awarded to you. A perfect throw is called an *ippon* and immediately ends the bout. Lesser manoeuvres may be awarded a *waza-ari*, *yuko* or *koika*.

Your chances of completing a successful throw depend largely on the quality of grip you have on your opponent. When you are within striking range, a quick press of the fire button makes your man make a grab and a bar chart in the top left hand corner displays the relative grips of the red and



while players together with their respective stamina. A successful throw can only be made if you are actually attacking so another press of the button lights up an indicator to denote who is the Toss (aggressor) at any given moment. The throw itself depends on a specific sequence of joystick movements. Some of these are outlined in the instructions, others you must discover for yourself. The different throws include a twice-swing (horrific! stomach throw) and *de achi butai* (advancing ankle sweep). There is a practice mode for you to try out these moves before you go into actual competition.

The thing that struck me most about Uchi Mata was the amount of realism that Martech have tried to include in the game. It is not as action packed as my *Way of the Exploding Fist* but more subtle and tactical. You really feel as if you are coming to grips with your adversary. G.R.H.

Touchline:

Title: Uchi Mata. **Company:** Martech, Ray Terrace, Penrhyon Bay, E. Sussex. **Ref:** 0123 766426. **Price:** £7.99. **Originality:** 8/10. **Graphics:** 8/10. **Playability:** 7/10. **Value:** 8/10.



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As might be surmised from this game's title, *Uchi Mata* is a darts simulation. And it's not a bad one either. The object of the game is to win the championship. There are eight contenders, rejoicing in names such as Belly Ball, Bare Shot Sidney and Limp Wrist Larry. You can meet any of the players as you progress from the quarter finals but the final is always against Jeremy Jim.

The match itself is the familiar 501, straight in, double out, a match being the best of three sets. When it is your turn to throw, a hand appears in front of the screen. It moves about slightly as you aim, so that you can't move directly to the white twenty all the time. To further complicate matters, only the diagonal movements of the joystick are effective. The result of all this is that winning the magic 180 is not quite as easy as it appears when the experts lean on the bar. Every time you throw a dart, your current score is chalked up on the blackboard. Then you must sit back and watch your opponent throw. Each of the competitors has his own preferences and quirks but it is up to you to work out what they are.

The game is full of nice additional touches. You can pause before the match in a game of round the clock. The numbers 1 - 20 must be hit in turn within a certain time limit. There are some animated back drops as your opponent throws and should you have difficulty working out exactly which numbers you have to hit in order to finish, there is a list of the more popular combinations on the cassette insert.

Most of the attempts at darts games released so far have been fairly poor and *Uchi Mata* is certainly the pick of the bunch for whiling those long hours when the pub is closed. G.R.H.

Touchline:

Title: 180. **Company:** Microtronic, 8-10 Paul St, London EC2A 4PW. **Ref:** 01 777 6580. **Price:** £2.99. **Machine:** C64. **Originality:** 4/10. **Graphics:** 7/10. **Playability:** 6/10. **Value:** 5/10.

SUPERSTAR PING PONG

Superstar Ping Pong is a table tennis simulation with enough options to provide a challenge for even the most demanding players. The balls are suspended in mid air and wave rapidly in the direction of the ball every time the fire button is pressed. Sounds too easy? That's what I thought until I lost the first two games 21-1 and 21-2 on the slowest possible settings!

Timing is crucial if you are to succeed in returning the ball over the net. Assuming that you actually make contact in the first place, the ball can leave the bat at any one of fifteen different angles. Initially, it seems that there is only one angle - one that sends the ball miles off the side of the table. The knack is to get the bat in position early and hit from late. Once you get used to returning the ball, then you can start to worry about where on the table you want to put it. Your normal shot is top spin but you can smash or slice the ball if you want to.

Before you even start to play, there are three pages of options for you to select from. You can play either against the computer or a human opponent. If you choose the latter option, you can elect to view the table from side on instead of the more normal end on position. There are three speeds which equate to different skill levels and you can also opt to let the computer move the bat for you - very useful when you first start.



The standard of your game is measured over six different abilities ranging from footwork and back hand skills to speed and endurance and these can be adapted to suit your individual preferences. Finally some choices about the length of the match and ball colours.

Once you get used to controlling the bat, *Superstar Ping Pong* is a very realistic simulation. The number of options mean that you can always set up a situation whereby the computer is just that little bit stronger than you are. There are also some nice little touches. It is very reassuring to know that the computer is capable of mistakes as well as you and is just as likely to serve the ball straight into the net. Well worth considering if you enjoy reaction games and want to get away from shoot-em-ups for a bit.

G.R.J.

Toolbox:

Pink Superstar Ping Pong, Company: US Gold, Cists 2/3, Midford Way, Midford, Wiltshire SN 74JL. Tel: 025 236 0388. Price: £9.99 cassette, £14.99 disk. Originality: 6/10. Graphics: 6/10. Playability: 7/10. Value: 7/10.



SANNION

Pink Pilot here. Just taking a break from training exercises to let you know that it looks as if we're getting those alien under control. What do you mean you don't know what I'm talking about? Look, you know we almost had a nuclear war a couple of weeks ago? You know it was only averted by the fact that the aliens turned up, determined to wipe us out because they thing we're too belligerent to share the U.N. rule? Well, now they're training young guys like me to vanquish the little blighters.

There's wave after wave of them, all different shapes and sizes and they are totally suicidal, man, you just have to keep on firing at them. It's not too bad at first but when they get to know you're a force to be reckoned with, they send in the big guns. Weird shaped craft which spin around and fairly make you dizzy.

Seeing the world from my ship is a pretty unbelievable experience, too. Banned alien landscapes, dark craggy scenery and miles upon miles of virgin forest. And, wow, some of the cities are really high tech. They've got defences which are hell to penetrate. And have you ever flown through a

They're looking for thousands of trainee pilots to combat the millions of aliens now swarming the planet. Why don't you sign up, you'll never get another chance like it? Fantastic.

M.C.

Toolbox:

Pink Sannion, Company: Thalamus, Price: £5.95. Machines: C64. Originality: 7/10. Graphics: 6/10. Playability: 10/10. Value: 8/10.

PANTHER

The city of Xenon is under attack from the usual hordes of alien invaders. You are the last remaining pilot in the Federal force and are trying to rescue the few survivors and stragglers still left in the city. The fact that the enemy now occupy large chunks of the city and will come at you with everything that they have got, should prove to be only a minor hindrance.

The game is a diagonally scrolling shoot-em-up, reminiscent of *Zaxxon* and *Blue Man*. Your Panther ship can move left and right, up and down as you fly over the landscape. Starting in the desert, you must fly over a large lake before reaching the city itself and spaceship beyond. The survivors are hiding in bunkers and oil rigs etc and you must land safely in order to pick them up. As you are constantly under attack from different waves of aliens, the chances are that you will have to make several runs through the area - a transport at the spaceship will return you to the appropriate position. As you near the city, so the enemy order will lock on to you unless you can fly at a very low level dodging buildings as you go.

Panther is not a bad little game, especially at the price. The control required to handle your craft should give even the most ardent arcade fan a good run for his money.

Toolbox:

Pink Panther, Company: Microscopic 8-10, Pond St, London EC2A 4WY. Tel: 01 277 8880. Machines: C64. Price: £3.99. Originality: 6/10. Graphics: 6/10. Playability: 6/10. Value: 7/10.



ANTIRIAD

After the inevitable nuclear war, and the horrendous nuclear winter, the earth begins to recover. From the chaos has emerged a new race of man, strong, brave and hardy, but powerful and simple too. The only shadow over their lives is the superstation surrounding the ancient city, built buried at the foot of a volcano.

Suddenly, from the sky appears a strange peril. An alien race, ruthless and bloodthirsty, manifests hundreds off a single people and put them to work in the mines. They make the ancient volcano their headquarters and the location of their power source.

But the young race does not give up hope. Secretly they raise young boys to seek revenge and save the race. One hero emerges: Tal. He is sent into the heart of the volcano to find the ancient sacred armour (in reality an anti-air combat suit) and with it he must destroy the power source at the heart of the volcano.

The first thing to do is to get through the forest, avoiding the many extraterrestrial bugs which lurk there, and reach the atmosphere. When you get to you'll find that you need anti-gravity boots and a blaster. So you have to get out of the armour and find the boots, which are at the top of a tree, then get back to the suit and find about to find the blaster.

All of this involves an awful lot of death destruction, mainly for you, because when you're not in the suit with your blaster, the only way you can kill anything is by chucking rocks at them. However you'd think it's not bad so there's hope for you yet.



On the whole it's quite a nice game, graphics are reminiscent of *Galdrion II*, and are varied and interesting. It's also very difficult so you'll need quite a bit of practice especially to get the hang of that floating feeling when you've managed to get the suit on the go. Make sure you pick up lots of powercells as you go along, though, because if you run out the suit dies and you have to get out. That's not nice if you're deep in the volcano! M.C.

Touchline:

Title: *Antiriad*. Company: *Pulse Software*, 273 Persimville Road, London N1. Tel: 01 278 8751. Machines: C64. Price: £8.95. Originality: 8/10. Playability: 7/10. Graphics: 9/10. Value: 8/10.



MARBLE MADNESS

This one is a strange game from Electronic Arts courtesy of Aristocraft. You're a marble, and you have to negotiate various 3D mazes. The problem with being a marble is that it's very difficult to control our movements. A gentle shove with the joystick to the left and you find yourself careening off the edge of the play area into an abyss.

Level one (of six) breaks you in quite gently and it may be worth your while hanging around a bit on this one just to get the hang on the controls. Each level has its own music, level two's is very good, level four sounds like a child playing bells hung on a synth!

To be honest, I couldn't really get addicted, although I know people who are. One of the main reasons for this is that each level loads separately from disk and this seems to take an awfully long time. The apparent reason for this is the sophistication of the graphics and sound. The graphics are truly wonderful, with beautiful colours and very attractive 3D landscapes.

Hazards to avoid include marble-eating worms, snakes which are black marbles which try and push you off the edge, bonuses to be gained if you get them first. There are vacuum cleaners which suck you off course and plenty of slopes and bumps to send you spinning into oblivion.

If you like a game which is totally frustrating and very difficult then this may keep you occupied for hours even if it's only to stare at the fascinating mazes. Definitely worth a try. M.C.

Touchline:

Title: *Marble Madness*. Company: *Aristocraft*, 88 Long Arch, Crown Gardens, London WC2E 9JH. Tel: 01 838 3417. Machines: C64. Price: £14.95 disk. Originality: 10/10. Graphics: 10/10. Playability: 7/10. Value: 8/10. [E]

ROBOSULT

They say that imitation is the sincerest form of flattery. If that's the case then Andrew Braybrook should be looking very flattered indeed. Robosult, is yet another attempt at a Pseudo-Bios Game Unlabeled even etc, sort of game. For my money though, this attempt has not succeeded half as well as some recent releases.

The basic principle behind the program, is to collect Death pods, place them in the assembly area, thus enabling you to jump to the next level. There are four pods to collect on each level. The only trouble is, they have to be collected in the correct order, otherwise they will be rejected. While you are running around, trying to find the pods, your energy is diminishing rather rapidly. Energy can be maintained by shooting the aliens running around. (Two per level as far as I can tell). To add to your troubles, you have a ready time counting down, which seems to be in permanent turbo drive.

The copy that I reviewed had no sound at all, (except for an opening number). The control of your craft is somewhat sticky also.

All in all I found this program a little mundane and uninteresting for my liking but at £1.99 who's complaining? P.E.

Footnote

Title: Robosult. Company: Alpha/Omega, 8 Kings Yard, Capensers Road, London E15 2DD. Tel 01 511 2418. Machine: C64. Price: £1.99. Originality: 4/10. Graphics: 3/10. Playability: 4/10. Value: 5/10.



ORPHEUS IN THE UNDERWORLD

After playing Orpheus in the Underworld for quite a few hours, I'm still not sure exactly what you are supposed to do. Obviously your task is to get out of Hades. How you do this is a mystery. Granted you can collect treasures on your travels, just how they help you, though, is not clear.

The game comprises of lots and lots of screens (well actually, it's just one screen with a few different things in it each time).



To get about, you have to jump over pits, swing from ropes and cross chasms. The one really novel idea in the game, which I personally found a bit annoying, is that the music only plays if you are moving. Stand still and the music stands still also.

The backdrops are somewhat confusing. I was always under the impression that the underworld was Hades, not the inside of an Egyptian tomb (well we live and learn).

Not wanting to seem all gloom and doom, the game does have a little of the classic, 'I must just have one more go' about it.

P.E.

Footnote

Title: Orpheus in the Underworld. Company: Alpha/Omega, 8 Kings Yard, Capensers Road, London E15 2DD. Tel 01 511 2418. Machine: C64. Price: £1.99. Originality: 4/10. Graphics: 4/10. Playability: 3/10. Value: 3/10.

COMPUTER HITS 3

Compilex tapes are all the rage at the moment and Computer Hits 3 is one of the better examples of the genre, offering 18 different titles. The emphasis is heavily on action and, unlike certain rival products, none of the games are really dull.

First off the block is Geoff Strongman Challenge. A training session allows you to build up certain muscles before going on to compete in events such as barrel rolling, highground ball and some wrestling. Blidon is an arcade adventure in which you play a cleric trying to find poisons and flowers in order to make a garland for the Queen.

Bigger guns to Hollywood now you trying to knock out 12 different stars with assorted props in an attempt to gain access to Spillman's office and steal a film. Cauldron puts you in the part of a witch trying to rid the land of the evil pumpkin and thus becoming the witch queen. The first tape ends with 3D Lunatic, a mix of strategy and shoot-'em-up as you try to protect your base from the invading Solidab forces.

Still one of the most popular games in the office, Crazy Comets is a highly addictive shoot-'em-up in which you blast

planets before they turn into supernovas. *Dynamite Dan* is a platform game in which you must find right sticks of dynamite with which to blow up the safe of the evil Dr Blonzo who has plans to destroy the world. Herbert's Dummy Run is set in a toy store with young Herbert trying to find his lost parents and eating jelly babies as he goes to keep his strength up.

Attack of the Mutant Caneb is one of the first games that I ever played on the 64 and it is still a classic blast from the past. What else could it be but a Jet Set Game with a name like that. The first game is another arcade adventure. The *Adventures of Ronin - Ronin's Bond*, based on the *Ronin* anime character. The object is to match jokes with punchlines as you attempt to rescue Ronin who has been kidnapped by a rival comedy act.

None of the titles are the sort of games where you think 'I must have that', but they are all average plus and 10 games for the money must represent good value.

G.R.H.

Touchline

Title: Computer Hit 5. Company: Brain Jolly, 384 Bell Street, Boreham, Surrey RH12 7AD. Tel: 07572 22883. Machine: C64. Price: £9.99. Value: 8/10.



STRIKE FORCE CORBA

Be warned, *Strike Force Cobra* is not a game to be completed in one sitting. This program will only be mastered by careful strategy and patience on your part.

The principle of the game, is to destroy the main computer of the enemy, before he blows up the entire world. To do this you pick a team of four superheros, from a list of eight. Each of your team is a master in one particular field. It's up to you to select the best team for the job. Once your team starts its mission, control of each member is achieved by simply pressing the corresponding number key (ie: two will make number two hero under control).

The complex is represented in 3D style, therefore movement takes some time to get used to. There are numerous obstacles to overcome: Electrical pressure pads,



robots, armed guards, locked doors, video cameras to name but a few. How you overcome each obstacle is a matter of trial and error.

There are some good sound effects used within the game. The only real criticism is the method of controlling/using your men (combinations of keys, F-keys and joystick). I always have difficulty remembering what does what.

For people who like killing, maiming, and generally causing havoc - with strategy as well, then this is a must. I've purposely not said too much about the game for fear of spoiling it for you. Go out and buy it.

P.E.

Touchline

Title: Strike Force Cobra. Company: Phoenix, 4 Little Essex Street, London WC2R 2JF. Tel: 01 834 0833. Machine: C64. Price: £9.99. Difficulty: 6/10. Graphics: 5/10. Playability: 8/10. Value: 5/10.

ACE OF ACES

The Mosquito was one of the great tri-axes of British warplanes during WWII, together with the Spitfire and Lancaster and was certainly the most versatile of the three. Very fast and manoeuvrable, it was used in both offensive and defensive roles. *Ace of Aces* puts you in control of a Mosquito and gives you the chance to try your hand at several different missions.

You can choose to fly on just one or a combination of missions from those available for selection. Possible targets include VEs, U-Boats and trains. An intelligence briefing gives you specific target locations together with weather details and you must then arm your plane. Depending on what you are trying to hit, you can choose from rockets, bombs and cannon. You should also fill up with fuel at this stage.

Once you have taken off (done automatically), you have total control of the plane. Two quick presses on the fire button and you can move the joystick to select pilot, navigator, engineering and bomb aiming functions. The navigator screen shows a map of you in relation to your targets. Bomb aiming involves opening the bomb doors and

selecting the appropriate weapon or auxiliary fuel tank. The engine room shows the view over the left or right wing and gives you access to throttle and flap control as well as a fire extinguisher should you come off second best in a dog fight. All the different functions are controlled by moving a marker to the appropriate dial or switch. There is no multitude of keys to try and remember.

The main part of the game is obviously with you in the pilot's seat. Again, there are only a few dials for you to keep your eyes on - airspeed, altimeter, compass and radar being the main ones. The only real problem comes when you are in battle. It is all too easy to get carried away and press the fire button twice in quick succession which promptly takes you on to a different screen.

The best part about *Age of Aces* is that, unlike other flight simulations, it is very easy to get into. This does not mean that it is easy to play, far from it, but there are practice modes to let you get the hang of things. Other nice features include the use of clouds when you can't see a thing and the awarding of bonus points if you hit the wrong targets so that you can't just go on blasting everything in sight. All in all, a very well thought-out and highly enjoyable simulation.

G.R.H.

Timeline

Title: Age of Aces. *Company:* US Gold. *Units:* 2/3 Welford Way, Welford, Northampton NN8 7AS. *Tel:* 025 356 1888. *Machines:* C64, PCor 5085.

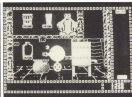
Originality: 8/10. *Graphics:* 8/10. *Playability:* 8/10. *Value:* 8/10.



TRAPDOOR

Based on the children's TV series of the same name, *The Trapdoor* stars a large blue, pudgy character called Berk who is responsible for the welfare of a nasty piece of work known only as 'an upstairs'. *The Trapdoor* in question is situated in the kitchens of the castle and contains a whole series of the most horrible monsters imaginable who, needless to say, always manage to get out whether by accident or design.

In the game, 'an upstairs' has decided that he wants



feeding and orders Berk to concoct such delicacies as a can of worms, boiled shrimp and eyeball soup. The various bits of equipment needed are to be found lying round the various rooms but Berk also needs to open the trapdoor and let out one or other of the monsters to aid him in his task. For example, to fry the eggs, Berk must first release the bird and find some way of making it lay the eggs before he can collect and cook them.

Objects can be picked up and carried and tipped up to reveal their contents. Levers are operated just by standing next to them. The attention to detail is excellent both in the animation of the characters and the methods necessary to produce the dishes. You have two so called friends to assist you. Berk, a skull, will give you a clue if you pick him up but Drott, a small bonyony creature seems more of a hindrance than a help. He loves eating the worms that you are trying to catch. The solution lies in finding some way of enticing him to fall down through the cellar.

The game's graphics are extremely large and colourful but they do suffer from attribute problems I know what you are thinking - if you wanted those, you would have bought a Spectrum and what makes the pill even more bitter to swallow is that the Spectrum version doesn't suffer from the problem! But this is only a minor hiccup in what must surely be one of the most original and enjoyable games of the year.

G.R.H.

Timeline

Title: Trapdoor. *Company:* Pinball. 4 Little Essex Street, London WC2E 8LP. *Tel:* 01 832 6823. *Machines:* C64, PCor 5085.

Originality: 10/10. *Graphics:* 8/10. *Playability:* 7/10. *Value:* 8/10.

CYRUS CHES II

With all the interest in the recent World Championship between Garry Kasparov and Anatoly Karpov, it is not really surprising that there should be a corresponding interest in chess programs. *Cyrus II* is one of the better programs around, both in ability and presentation.

The game's presentation is what struck me most about the *Cyrus II*. The pieces are large and clear and easily



distinguished, something that cannot always be said for other chess programs. Moving is simplicity itself. Select a piece with the cursor and it changes color so that you can see instantly that you have selected the one that you wanted. Similarly when you select the destination square. There is no need to bother with algebraic notation or P-K4 or whatever. If the computer won't accept your input, it is because you are trying to make an illegal move.

Pressing the space bar brings up a list of options as well as details of the moves made so far. You can take moves back (shame on you!), change the computer's skill level, swap sides or even ask for a hint. Positions can be set up for problems solving and there is a demo mode if you get fed up of being beaten.

The crutch question when it comes to considering any chess program is how good is it and similarly, it is almost impossible to answer. For any beginner or someone who is out to improve their game, any program should suffice. The optimum is to set the skill level just a little bit better than you are. For the more serious player, Cyrus II will still provide a strong challenge although you would ideally need to try a few games to assess its ability against yours.

But for the majority of players, Cyrus II makes an ideal opponent and should be high on your list of programs to consider.

G.R.H.

Touchline

Title: *Cyrus II*. Company: *Allypax*, 1 Orange Street, Sheffield Markham C64 Price: £19.99
Originality: 3/10. Graphics: 8/10. Playability: 8/10. Value: 8/10.

FIST II

After all the hype, *Fist II* - the Legend Continues has finally hit the shelves. The original, you may remember, was the first of a plethora of martial arts game. Way of the Exploding Fist was a straightforward karate simulation, you trying to knock his out of your opponent before he did likewise to you. In this sequel, Melbourne House has kept the same combat ideas but transposed the action to an arcade adventure.

The scenario is that the Warriors of the Exploding Fist have been betrayed over the centuries and the land is now under the rule of the evil Warlord. Nobody has seen his fortress but plenty of rumors exist, narrating volcanoes and underwater labyrinths. The fighting secrets of the Masters are supposed to be hidden somewhere in the land in the form of scrolls and these are shrines and temples to be found where an aspiring master can meditate and seek guidance. Such a person is you. Although initially weak and inexperienced, the elders hope that you possess the necessary talent to overcome your common adversary.

The world is that you must find certain knowledge in the form of trigrams. The secret is to match that trigram with the appropriate temple and thus learn its secrets. For example, Ch'ien is associated with strength and Tai connected with imparting a sense of will being when surrounded by malignance. Temples are also important as they restore your energy and heal you should you be poisoned.

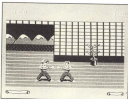
There are a variety of foes for you to fight ranging from simple but aggressive peasants to mighty Shoguns and deadly assassins. They are also creatures of the wild to be fared, snakes and panthers etc. The action takes place in a variety of locations - outside, in buildings and caves and even in water. This last location is tricky as not all your moves are effective here. Movement is only from side to side but there are pits to fall into and ladders to climb. The only annoying part of the game is as you move round, waiting for the next screen to catch you up - you move off one edge and then action is suspended as the next one scrolls past you.

The idea of a quest rather than just straight combat works very well indeed as there is the added impetus to have just one more go and find out what is behind the next corner. Be warned though, your task will not be an easy one and you will have to do really well before the warlord even takes notice of you. Fortunately, you have the option to practise all your moves beforehand. Side two of the tape contains a training mode. A nice touch from a game destined to beat the charts.

G.R.H.

Touchline

Title: *Fist II*. Company: *Melbourne House*, 60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4DR. Tel: 01 861 8811. Machine: C64. Price: £9.99.
Originality: 3/10. Graphics: 8/10. Playability: 7/10. Value: 8/10.



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typing and filing which will get you used to the package and some of its capabilities.

Setup

Upon loading the program you will be presented with a notice board. Here you will find any message that the previous user has left for you. An alert date function lets you set up today's date for use within the program while the Diary function allows you to look at the selected months appointments, birthdays etc.

Once you have finished with the notice board then it's on to the main menu. Here you can select at the press of a key the following options:

- Accounts - the book keeping functions
- Typing - the wordprocessor for typing letters
- Filing - the database
- Spreadsheets - for condition forecasts
- General - Altering screen colours, company name etc.
- Backup - Copy to disk
- Close Down - Finish for the day and exit notebook

One extremely nice function is the ability to press the HELP key at any time. Should you press the key while on the main menu a help screen similar to the above is given together with where you can find more information within the package. When help is



selected you are also given the chance of printing the help screen out and editing the screen.

Wordprocessing

Should you select typing from the main menu then the computer will go away and load the Wordprocessor from disk. Again you will be presented with a menu of options, as with the main menu. These are:

- Edit text
- Load from disk
- Save on disk
- Print on paper
- Clear template and memory
- Destroy text file

I think that all of the above options are self explanatory and therefore need not be dealt with in more detail.

The wordprocessor isn't as flashy as some of the dedicated wordprocessor programs that are available on the market it does however offer a few 'nice' functions which make it both pleasant and easy to use. Options available to the user are as you would expect inserting and deleting of lines and characters, an automatic insert that allows you to add text in the middle of text already entered. Unlike with a typewriter the only time that you are required to enter a carriage return is when you want to have a line feed, such as at the end of the text. The program has an automatic word wrap which will prevent the rest of the paragraph from appearing on one line.

The find option allows you to search any word in the text making it easy to move around the text.

The block functions allow you to delete blocks of text from your article as well as print them or move them elsewhere.

If you are lucky enough to own a printer that supports such features as Underline, Italics or New Letter Quality then you can make use of these. The setup printer section of the program allowing you to customise the program for specific printers.

A couple of extremely nice and useful touches to this word processor are the 'date' and 'time' commands. Whenever these are found within a document the program will automatically insert the current date, entered when loading the program and the name and address of your company.

For companies who have large

mailing lists you will no-doubt find the mailmerge option of use. This will allow you to insert information within your text that has been retrieved from the database, for example the name and address of all your clients. Provision is also made to allow you to enter a merge list, the information to be entered into the text, from the keyboard which is useful for those one off letters. A number of advanced features are included here with allow you to perform calculations on information before it is entered into the letter you can even set the number of decimal places that are used when printing numbers.

All in all the wordprocessor is excellent for producing small documents or letters. As I have said more of the fancy features available with larger wordprocessors, such as spellchecking, are present but it will make writing out letters etc. much easier.



Storing Data

The database or filing section of the program is where you can store information such as names and addresses or items in stock.

For those of you who may have never come across a database it can be viewed as a type of electronic card index text. As with the cards you can decide what information that you wish to store and in what format you want to hold it. However a database is much more flexible. Let's say for example that you have a list of club members stored under their surname. The file may contain their name, address and whether they have paid their subscription.

Now let's say that you want a list of all people who haven't paid up. With the card index system you would have to go through each card in turn taking out the people who hadn't paid. With a database then you could ask it to give you a list of people who hadn't paid

and it would do so almost immediately. Further more you could then get the computer to print out a reminder letter to them with the amount they owe, complete with their name and address in the relevant parts of the letter.

Defining the layout of your file is extremely easy. When you design the way that it's going to look you can specify that particular entries must be text, numeric only (with a limit on decimal places) or a date field. Once a database has been set up there are no problems sorting it into any order that you require, for example you could produce a list of people who live in London in alphabetical order. It is even possible to put several different conditions that must be met. For example you could ask for a list along the following lines:

A list of all the people living in London whose subscription has run out.

As you can no doubt appreciate this is much easier than having to do it by hand.

When printing the information from within *Access-Link* it is possible to select REPORT format or LABELS format. The REPORT function allows you to print a neat report with up to eight lines given over to each record. You can decide how you want the printout to be laid out and the fields that you require printing.



Labels, as the title suggests, allows you to print out the information stored within *Access-Link* on to self-adhesive labels. Each label can have up to six lines printed on it and up to three different fields. You can print either one, two or three labels across the paper.

Spreadsheet

A spreadsheet is of use to anyone who has to produce a list of related calcu-

lations, for example a forecast on the cashflow of a company. Usually these forecasts are produced on large pieces of paper split into rows or columns. Specific information is placed into the gaps remaining. Then calculations are carried out on either the rows or columns to show totals.

The computer version of this is called a spreadsheet. The screen acts as a window over the larger spreadsheet allowing you to see specific portions of your data. You can type headings, figures and formulae into any location on the sheet, then once the data has been entered you can perform calculations at the point of a button.

The spreadsheet offers all of the usual facilities associated with such a program. As with all the sections of this software the use of the program is clearly explained and you should be able to use it without too many problems.

Cash Book

The cashbook will probably be the most important part of the software package. It allows you to simply type in details of everything you buy and sell. You have the option of doing this each day, or every few days, as long as you keep the information accurate and as up to date as possible. At the end of each week you select the END OF WEEK function which will automatically print out a list, in the form of double-entry account book pages, of everything entered during the last week. Even tedious things such as VAT are taken care of.

The facility exists to produce Profit/Loss reports at any time showing exactly where you are spending most money, and how much you have spent this year.

As with all of the programs in this package you are presented with the various options when the program starts. Available to you are:

Entries which allows you to enter details of income payments, bankings etc.

Print - allows you to print out lists of all information entered.

General - Setting up the cash book headings - This allows you to alter the Analysis headings and print out various types of reports.

Up until now I have stated that accounts are produced on a weekly



basis. One nice feature is that you can select to work on a monthly basis should you prefer.

Setting up the program to suit your own business is extremely easy, all of the headings being under your control. The only slightly confusing thing is that you must give each heading an analysis code. These codes must be in the range of 100-999 as well as there being special groups within these. For example codes heading in 00 are main group titles. You can of course print off a list of headings and codes at any time.

Should you choose the entries option of the program then you will be asked what type of entry that you wish to make to the system. Options available are Receipts, Bankings, Payments, Transfers and Standing orders. All of which need no further explanation.

At some stage within the program you will require printouts of specific details from your cash book. All of the following are available and will no doubt keep you accountants happy for quite a while:

Audit Trail - A list of everything that you have entered this last week.

Sales Report - A report of each sales, and any other income.

Sales Analysis - A list of the total sales of each heading for the current week.

Purchase Report - A record of everything that you have purchased over the last week.

Purchase Analysis - Total purchases for the last week under each heading.

Money in/out - A list of all money received or paid out by the business during the last week.

Bank Report - All entries affecting your bank account.

Transfers - A list showing all transfers you have entered during the past week. Incidentally this is what accountants call a Nominal Journal.

Stock by Value - A list showing a summary of each stock group and its value.

Day Analysis Sales and Purchases - A list of all sales or purchases for each day of the week.

Trading - This shows all Sales, Purchases and Expenses during this period, and then produces a calculation of your Gross and Net profit.

Balance Sheet - A balance sheet for your business.

VAT Report - A VAT report can be printed at any time though you only need one when you are required to fill in a VAT form each quarter.

That just about covers the cash book operations of the program. As you can no doubt see it is extremely comprehensive and obviously far easier to use than a number of books. The number of different reports that can be produced should definitely keep your accountant quiet for quite some time.

Hits and Pieces

I have covered the main sections of the program above, however there are quite a number of smaller but very useful facilities available within the program. I have already mentioned the use of the HELP key and that gives a brief description of whatever you are doing together with the page number of where to find more information in the manual. As well as the help key many others have functions.

F1 will allow you to access the programs disk functions. From within this option you can Display the files on the disk in the drive that are relevant to the section of the program you are using. You can print a full list of all the files should you require. Fm6 display will tell you just how much room is left on your disk and you can format new disks when the need arises.

F2 calls up the printer options. Here you can set the size of the paper that you are using, tell the printer to move to a new page, check that the printer is on-line and ready to use.

Date	Description	VAT	Total
Jan 1
Jan 2
Jan 3
Jan 4
Jan 5
Jan 6
Jan 7
Jan 8
Jan 9
Jan 10
Jan 11
Jan 12
Jan 13
Jan 14
Jan 15
Jan 16
Jan 17
Jan 18
Jan 19
Jan 20
Jan 21
Jan 22
Jan 23
Jan 24
Jan 25
Jan 26
Jan 27
Jan 28
Jan 29
Jan 30
Jan 31
Jan

Page Pause will set the program up in such a way that the printer will pause after each page, this will allow you to use single sheet paper.

The Printer Via/No option is quite an oddity, although quite useful, as the program can be forced to produce all printouts to the screen rather than to the printer.

The Lincked key at the top of the keyboard can be used at any time to move the paper up one line in the printer.



Function Key F3 gives you access to what is probably one of the most useful facilities, that of the electronic jotters.

Electronic jotters allow you to use all or part of the screen as a form of notepad. This means that you could take telephone messages, notes etc, and place them in a jutter, just as you would do with a writing pad. The contents of a jutter can be recalled at anytime and reproduced on the printer.

The jutter can also be used to 'capture' whatever is on the screen where the F3 key is pressed. This means that you can copy the screen from one program, then using the paste function you can then place this information into another program. For example you may take a record from the database and then paste it into a word-processing file. Function key number 4 allows you to set the date, call up a calculation, handy for quick calculations, and use the printer as a typewriter, i.e. you enter type a single line on the keyboard and then send it to the printer.

A diary is available on the F5 key. This will display a calendar for the current month on the screen. You can then set up a diary page for any month allowing you to set up appointments for the month etc.

Should you ever require a copy of the screen the F6 will provide you with a copy on the printer.

While you are in the accounts

mode of Mircroclerk you can examine any Analysis Heading, change the VAT code etc. This allows you to gain instant access to the amount of money in your Bank Account, or how much money is owed to you.

Verdict

Because this package is so comprehensive it is impossible to give you more than just a taste of what it can do. The package is continually being expanded, with new modules becoming available all the time. In fact I have just received Sales Ledger and Purchase Ledger programs that can be used with the program.

Because of the complexity and versatility of the program it is being given to an accountant and to someone who is just setting up a small business to use in a practical application. I hope that in a month or so I will be able to report their reaction to the program together with more details about the Sales and Purchase Ledger.

Amstrad and Alan Sugar have made a killing in the small business market with their range of small business computers that come complete with software. Mircroclerk is superior to that supplied with these machines and I am sure that the C128 and Commodore would have, and may well, get a larger share of the small business market if this software was given away with the machine. Even so since it is possible to purchase a complete C128 system with two disk drives and a printer for under £1000 this product is well worth taking a look at.

Footnote

Commodore UK: 1 Murray Road, Winton, Croy, Northants. Tel: 0538 263335.

UK Software: 1 Shefffield Road, South-Borough, Tinsdale Wolds, Kent TN4 6PD. Tel: 0821 27434.

Prison Bus Ltd

Mircroclerk: £95.99

Extension Packages

Sales Ledger, Purchase Ledger, Payroll £75 each

Special Offers

Mircroclerk plus 1 extension: £120

Mircroclerk plus 3 extensions: £180

Mircroclerk plus extensions: £225

Sales Ledger and Purchase Ledger: £120

Sales Ledger, Purchase Ledger and Payroll: £175.

Evesham Micros

ALWAYS A STEP AHEAD

DOLPHIN DOS
THE EFFECT IS STAGGERING.

STOP PRESS!!
Dolphin DOS has just over 100 programs.

Now established as THE personal operating system for the IBM compatible hardware, Dolphin DOS has spread to other business, hobby and high-end applications, including the Creative Graphics team. For speed, power, business, hobby and high-end applications, it is comparable with the vast majority of commercial software, and offering a truly unparalleled 100% compatibility with the vast majority of software with Superdisk, spanning up to the ending of the program and of DOS itself. It is a complete DOS with a 100% IBM compatible program, and your existing files will be compatible.

FITTING

Fitting involves the installation of the software (which typically, for most IBM and non-IBM (486) 286, 386, 486, 586, 686, 786, 886, 986, 1086, 1186, 1286, 1386, 1486, 1586, 1686, 1786, 1886, 1986, 2086, 2186, 2286, 2386, 2486, 2586, 2686, 2786, 2886, 2986, 3086, 3186, 3286, 3386, 3486, 3586, 3686, 3786, 3886, 3986, 4086, 4186, 4286, 4386, 4486, 4586, 4686, 4786, 4886, 4986, 5086, 5186, 5286, 5386, 5486, 5586, 5686, 5786, 5886, 5986, 6086, 6186, 6286, 6386, 6486, 6586, 6686, 6786, 6886, 6986, 7086, 7186, 7286, 7386, 7486, 7586, 7686, 7786, 7886, 7986, 8086, 8186, 8286, 8386, 8486, 8586, 8686, 8786, 8886, 8986, 9086, 9186, 9286, 9386, 9486, 9586, 9686, 9786, 9886, 9986, 10086, 10186, 10286, 10386, 10486, 10586, 10686, 10786, 10886, 10986, 11086, 11186, 11286, 11386, 11486, 11586, 11686, 11786, 11886, 11986, 12086, 12186, 12286, 12386, 12486, 12586, 12686, 12786, 12886, 12986, 13086, 13186, 13286, 13386, 13486, 13586, 13686, 13786, 13886, 13986, 14086, 14186, 14286, 14386, 14486, 14586, 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162886, 162986, 163086, 163186, 163286, 163386, 163486, 163586

On The Blink

Basic programmers take heart. This new software from Information Development Systems should make life a lot easier.

By Paul Eves

Calling all Basic programmers! Drop whatever you're doing and read on.

How many times have you been developing a large scale Basic program and wished that there was an easier way? Now there is because *Blinker-64* from Information Development Systems has come to your rescue.

Just what is *Blinker-64*? The answer is quite simple. *Blinker-64* is a helge editor for Basic programs. It enables programs to be constructed from a number of small modules stored as files on one or more disks.

The main advantage to this approach to programming are firstly that small modules or subroutines are easier to handle, edit and debug. Secondly, programming in Basic is made more productive and enjoyable. Modules developed for one program can be saved as part of a library of modules and used as component parts of others as easily as standard Basic statements. As your library grows, so your ability to produce larger and more complex programs increases.

Basically, *Blinker-64* allows the programmer to make up a program of subroutines, then link them together to form a whole. The following example should show this clearly.

Normal Basic Program

```
10 POKE$1280, 0:POKE$1281,0:
POKE$46,2
15 GOSUB1000
20 PRINT "NOW IS THE TIME ETC
ETC"
30 GOSUB600
40 PRINT "PRESS ANY KEY TO
CONTINUE"
50 GOSUB 700
60 END
500 POKE$300, PEEK (51265) AND
254
510 RETURN
```

```
500 POKE$1280,PEEK (51265) OR 14
620 RETURN
700 WAIT$99.9:POKE$99,0
730 RETURN
```

As you can see, this program is made up of a number of subroutines, some may be called repeatedly, others only once. Trying to keep track of all these subroutines in a large program can become tedious. Moreover the next time you write something that you have to make all the subroutines again which can become very monotonous.

With *Blinker-64* the above program would look like this:

Blinker-64 Program

```
10 POKE$1280,0 POKE$1281,0
POKE$46,2
20 GOSUB "SCREEN OFF"
30 PRINT "NOW IS THE TIME ETC
ETC"
40 GOSUB "SCREEN ON"
50 PRINT "PRESS ANY KEY TO
CONTINUE"
60 GOSUB "GET KEY"
70 END
```

The subroutines 'screen off', 'screen on' and 'get key' would be individual files saved as your library disk.

When *Blinker-64* is invoked with your blink command, it runs through your BASIC program (ie, the one in memory). Whenever it comes across a GOSUB 'xxx', it fetches that subroutine from your disk and appends it at the end of your base program. After all operations have been done it remembers the entire program, substituting your named subroutines for numbered ones.

The above files are known as CODE files. One other use of *Blinker-64* is the handling of DATA files.

The principle is the same, with a couple of exceptions. DATA files can only contain REM and DATA token words. Any other token word would

result in a fatal error.

There is a maximum of 255 distinct module references that can be appended in a single run. Line number values, previously considered important when appending or merging Basic programs, are now of little consequence. *Blinker-64* always produces a correctly numbered program, regardless of line numbers in any constituency source module.

Whenever *Blinker-64* finishes a run, a summary screen is displayed giving some simple statistics about the linked program. The summary looks like this:

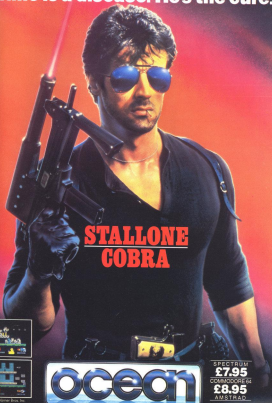
1. Start of BASIC - Lower limit of BASIC memory area
2. Start of VARIABLES - End address of BASIC program
3. Top of BASIC - Upper limit of BASIC memory area
4. CODE modules named - Number of Code modules included, including base mod.
5. CODE modules included - Number of modules in linked program
6. DATA modules named - Number of DATA modules specified as command line
7. DATA Modules included - Number of DATA modules included in linked program
8. Bad Filenames - Number of illegal module references encountered
9. Bad line numbers - Number of illegal line numbers encountered.

There is so much more I could say about the program, unfortunately space is running out. All I need say is that after trying this program out, I felt that no Basic programmer should be without it. □

Function

Company: Information Development Systems. Address: 24 Dering Rd, Epsom, Surrey, Tel: 87172 2275. Price: £29.95.

Crime is a disease. He's the cure.



STALLONE COBRA



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ocean

SPECTRUM
£7.95
COMMODORE 64
£8.95
AMSTRAD

© Central Games and Software Ltd 1986

Disk Archive

A handy set of two programs to help you save your programs to tape in a convenient form.

By Jean Lebaulley

The purpose of these programs is to copy whole disks on tape, in auto mode then in a convenient line volume form.

The backup on tape proceeds at 18 times the standard C64 speed (even faster than standard turbo tape format). This means that the 17K of a 1541 disk drive are packed on only five minutes of tape.

Data is saved in three steps each of which saves approximately 60K of data, in track increasing order. All blocks are transferred, even free ones. This means that a disk copy will always fit the same length of tape, a useful feature if you want to rewrite updated data over an already existing copy. (However there is one exception — if blocks do not read properly, they are written in checksum to the entire copy will be shorter. It also means that it is not really worthwhile to use this program to save nearly empty disks.)

The program is made up of two complementary parts: MICOPTD and MICOPTD. MICOPTD saves data on tape and MICOPTD reads it back to disk. These programs can also be used with the 1571 disk drive in 1541 mode. However only single sided disks on the first side of a double sided one can be saved with this version of the program. To use MICOPT, just RUN the two Basic programs (when keying these, don't forget the DATA 000,000... lines, since the checksum does not detect such omissions). Of course, since they are created on disk, a formatted disk must be in the drive.

Getting Started

Load MICOPTD (disk to tape). Make certain that you are past the leader of the tape.
Put the disk to be copied in the drive.
Run MICOPTD: the introductory message appears.
Press record and play (the tape does not move yet).

Press RETURN. The program starts to read the disk, then transfers its contents on to tape in three steps. DO NOT stop the recorder between steps. When the process ends the message "END OF COPY" appears, along with error messages if needed. Note the tape counter value.

An error does not always mean that the whole copy is bad. However when the tape is read the same error will be repeated on the new disk (also the copy on tape will be shorter). Therefore, it is up to the user to decide what to do when such an error occurs.

Reading Back

Load MICOPTD (tape to disk).

Put a new disk in the drive.

Put a cassette into the cassette. Position tape to read the first of the three subsections previously saved. Reading over the end of other data does not matter since MICOPT only starts reading after having found a special synchronizing leader.

Run MICOPTD.

The read back proceeds in the same way as MICOPTD, in three steps.

At the end of the process, the message "END OF COPY" appears. Remove the disk from drive (it doesn't matter if the red LED is still on, this is normal).

Two kinds of errors can arise during the readback process. Unfortunately, they are almost always fatal.

WRITE ERROR TRACE NN — means that the drive could not read the data, it just writes on that track. This is usually caused by a bad disk. Try again with another one (see also TAPE LOADING ERROR).

TAPE LOADING ERROR — The cassette could not be read back properly.

This is usually caused by one of the following:

Bad tape; use only good quality cassette. Although the encryption scheme used to write on tape is very reliable by itself, a single false bit in the 60K's causes the error. I previously wrote these programs using standard turbo routines but an error occurred nearly every time in one of the three sequences, it was also slower and the length of tape used was data dependent. (It took less time to save than TPA.) Try to save 60K with standard turbo on the same tape you are very likely to see several errors, not just one.

Read head is dirty, clean it.

Read head has gone out of alignment since the tape was written. Realign it.

The recorder has been knocked or moved during read or write (this causes tape speed changes that can lead to errors).

The tape has been damaged, usually unrecoverable.

Too much friction inside cassette.

Revisit it and retry.

You can find it is recommended leave blank space on tape between disks to do that, just press the 7 key and the recorder starts. Stop by pressing any other key.

MICOPTD.DRIVE

```

00 10 REM
01 10 REM ***** MICOPTD ON 01
02 10 REM
03 10 REM
04 10 REM TAPE DISK TO TAPE BAC
05 10 REM PROGRAM
06 10 REM SAVED UP TO 30 SECONDS
07 10 REM
08 10 REM
09 10 REM ON A SINGLE DISK DRIVE
10 10 REM
11 10 REM
12 10 REM WRITTEN BY J. LEBEAULLEY
13 100 REM
14 100 REM B.E. "MICOPTD" P.
15 100 PRINT "DISK TO TAPE BAC"

```



```

10 GOSUB PRG1:PRINT "CREATE RECORD"
20 GOTO 100
30 GOSUB PRG2:PRINT "DELETE RECORD"
40 GOTO 100
50 GOSUB PRG3:PRINT "EDIT RECORD"
60 GOTO 100
70 GOSUB PRG4:PRINT "LIST RECORDS"
80 GOTO 100
90 GOSUB PRG5:PRINT "QUIT"
100 OPEN "C:\C64\DATA\RECORDS.DAT" FOR APPEND AS #1
110 PRINT #1:PRINT "NAME,AGE,SEX,HEIGHT,WEIGHT"
120 PRINT #1:PRINT "-----"
130 PRINT #1:PRINT "1,20,M,170,70"
140 PRINT #1:PRINT "2,25,F,160,55"
150 PRINT #1:PRINT "3,30,M,180,85"
160 PRINT #1:PRINT "4,35,F,150,45"
170 PRINT #1:PRINT "5,40,M,190,95"
180 PRINT #1:PRINT "6,45,F,165,60"
190 PRINT #1:PRINT "7,50,M,200,105"
200 PRINT #1:PRINT "8,55,F,175,75"
210 PRINT #1:PRINT "9,60,M,210,115"
220 PRINT #1:PRINT "10,65,F,185,85"
230 PRINT #1:PRINT "11,70,M,220,125"
240 PRINT #1:PRINT "12,75,F,195,95"
250 PRINT #1:PRINT "13,80,M,230,135"
260 PRINT #1:PRINT "14,85,F,205,105"
270 PRINT #1:PRINT "15,90,M,240,145"
280 PRINT #1:PRINT "16,95,F,215,115"
290 PRINT #1:PRINT "17,100,M,250,155"
300 PRINT #1:PRINT "18,105,F,225,125"
310 PRINT #1:PRINT "19,110,M,260,165"
320 PRINT #1:PRINT "20,115,F,235,135"
330 PRINT #1:PRINT "21,120,M,270,175"
340 PRINT #1:PRINT "22,125,F,245,145"
350 PRINT #1:PRINT "23,130,M,280,185"
360 PRINT #1:PRINT "24,135,F,255,155"
370 PRINT #1:PRINT "25,140,M,290,195"
380 PRINT #1:PRINT "26,145,F,265,165"
390 PRINT #1:PRINT "27,150,M,300,205"
400 PRINT #1:PRINT "28,155,F,275,175"
410 PRINT #1:PRINT "29,160,M,310,215"
420 PRINT #1:PRINT "30,165,F,285,185"
430 PRINT #1:PRINT "31,170,M,320,225"
440 PRINT #1:PRINT "32,175,F,295,195"
450 PRINT #1:PRINT "33,180,M,330,235"
460 PRINT #1:PRINT "34,185,F,305,205"
470 PRINT #1:PRINT "35,190,M,340,245"
480 PRINT #1:PRINT "36,195,F,315,215"
490 PRINT #1:PRINT "37,200,M,350,255"
500 PRINT #1:PRINT "38,205,F,325,225"
510 PRINT #1:PRINT "39,210,M,360,265"
520 PRINT #1:PRINT "40,215,F,335,235"
530 PRINT #1:PRINT "41,220,M,370,275"
540 PRINT #1:PRINT "42,225,F,345,245"
550 PRINT #1:PRINT "43,230,M,380,285"
560 PRINT #1:PRINT "44,235,F,355,255"
570 PRINT #1:PRINT "45,240,M,390,295"
580 PRINT #1:PRINT "46,245,F,365,265"
590 PRINT #1:PRINT "47,250,M,400,305"
600 PRINT #1:PRINT "48,255,F,375,275"
610 PRINT #1:PRINT "49,260,M,410,315"
620 PRINT #1:PRINT "50,265,F,385,285"
630 PRINT #1:PRINT "51,270,M,420,325"
640 PRINT #1:PRINT "52,275,F,395,295"
650 PRINT #1:PRINT "53,280,M,430,335"
660 PRINT #1:PRINT "54,285,F,405,305"
670 PRINT #1:PRINT "55,290,M,440,345"
680 PRINT #1:PRINT "56,295,F,415,315"
690 PRINT #1:PRINT "57,300,M,450,355"
700 PRINT #1:PRINT "58,305,F,425,325"
710 PRINT #1:PRINT "59,310,M,460,365"
720 PRINT #1:PRINT "60,315,F,435,335"
730 PRINT #1:PRINT "61,320,M,470,375"
740 PRINT #1:PRINT "62,325,F,445,345"
750 PRINT #1:PRINT "63,330,M,480,385"
760 PRINT #1:PRINT "64,335,F,455,355"
770 PRINT #1:PRINT "65,340,M,490,395"
780 PRINT #1:PRINT "66,345,F,465,365"
790 PRINT #1:PRINT "67,350,M,500,405"
800 PRINT #1:PRINT "68,355,F,475,375"
810 PRINT #1:PRINT "69,360,M,510,415"
820 PRINT #1:PRINT "70,365,F,485,385"
830 PRINT #1:PRINT "71,370,M,520,425"
840 PRINT #1:PRINT "72,375,F,495,395"
850 PRINT #1:PRINT "73,380,M,530,435"
860 PRINT #1:PRINT "74,385,F,505,405"
870 PRINT #1:PRINT "75,390,M,540,445"
880 PRINT #1:PRINT "76,395,F,515,415"
890 PRINT #1:PRINT "77,400,M,550,455"
900 PRINT #1:PRINT "78,405,F,525,425"
910 PRINT #1:PRINT "79,410,M,560,465"
920 PRINT #1:PRINT "80,415,F,535,435"
930 PRINT #1:PRINT "81,420,M,570,475"
940 PRINT #1:PRINT "82,425,F,545,445"
950 PRINT #1:PRINT "83,430,M,580,485"
960 PRINT #1:PRINT "84,435,F,555,455"
970 PRINT #1:PRINT "85,440,M,590,495"
980 PRINT #1:PRINT "86,445,F,565,465"
990 PRINT #1:PRINT "87,450,M,600,505"
1000 PRINT #1:PRINT "88,455,F,575,475"
1010 PRINT #1:PRINT "89,460,M,610,515"
1020 PRINT #1:PRINT "90,465,F,585,485"
1030 PRINT #1:PRINT "91,470,M,620,525"
1040 PRINT #1:PRINT "92,475,F,595,495"
1050 PRINT #1:PRINT "93,480,M,630,535"
1060 PRINT #1:PRINT "94,485,F,605,505"
1070 PRINT #1:PRINT "95,490,M,640,545"
1080 PRINT #1:PRINT "96,495,F,615,515"
1090 PRINT #1:PRINT "97,500,M,650,555"
1100 PRINT #1:PRINT "98,505,F,625,525"
1110 PRINT #1:PRINT "99,510,M,660,565"
1120 PRINT #1:PRINT "100,515,F,635,535"
1130 PRINT #1:PRINT "101,520,M,670,575"
1140 PRINT #1:PRINT "102,525,F,645,545"
1150 PRINT #1:PRINT "103,530,M,680,585"
1160 PRINT #1:PRINT "104,535,F,655,555"
1170 PRINT #1:PRINT "105,540,M,690,595"
1180 PRINT #1:PRINT "106,545,F,665,565"
1190 PRINT #1:PRINT "107,550,M,700,605"
1200 PRINT #1:PRINT "108,555,F,675,575"
1210 PRINT #1:PRINT "109,560,M,710,615"
1220 PRINT #1:PRINT "110,565,F,685,585"
1230 PRINT #1:PRINT "111,570,M,720,625"
1240 PRINT #1:PRINT "112,575,F,695,595"
1250 PRINT #1:PRINT "113,580,M,730,635"
1260 PRINT #1:PRINT "114,585,F,705,605"
1270 PRINT #1:PRINT "115,590,M,740,645"
1280 PRINT #1:PRINT "116,595,F,715,615"
1290 PRINT #1:PRINT "117,600,M,750,655"
1300 PRINT #1:PRINT "118,605,F,725,625"
1310 PRINT #1:PRINT "119,610,M,760,665"
1320 PRINT #1:PRINT "120,615,F,735,635"
1330 PRINT #1:PRINT "121,620,M,770,675"
1340 PRINT #1:PRINT "122,625,F,745,645"
1350 PRINT #1:PRINT "123,630,M,780,685"
1360 PRINT #1:PRINT "124,635,F,755,655"
1370 PRINT #1:PRINT "125,640,M,790,695"
1380 PRINT #1:PRINT "126,645,F,765,665"
1390 PRINT #1:PRINT "127,650,M,800,705"
1400 PRINT #1:PRINT "128,655,F,775,675"
1410 PRINT #1:PRINT "129,660,M,810,715"
1420 PRINT #1:PRINT "130,665,F,785,685"
1430 PRINT #1:PRINT "131,670,M,820,725"
1440 PRINT #1:PRINT "132,675,F,795,695"
1450 PRINT #1:PRINT "133,680,M,830,735"
1460 PRINT #1:PRINT "134,685,F,805,705"
1470 PRINT #1:PRINT "135,690,M,840,745"
1480 PRINT #1:PRINT "136,695,F,815,715"
1490 PRINT #1:PRINT "137,700,M,850,755"
1500 PRINT #1:PRINT "138,705,F,825,725"
1510 PRINT #1:PRINT "139,710,M,860,765"
1520 PRINT #1:PRINT "140,715,F,835,735"
1530 PRINT #1:PRINT "141,720,M,870,775"
1540 PRINT #1:PRINT "142,725,F,845,745"
1550 PRINT #1:PRINT "143,730,M,880,785"
1560 PRINT #1:PRINT "144,735,F,855,755"
1570 PRINT #1:PRINT "145,740,M,890,795"
1580 PRINT #1:PRINT "146,745,F,865,765"
1590 PRINT #1:PRINT "147,750,M,900,805"
1600 PRINT #1:PRINT "148,755,F,875,775"
1610 PRINT #1:PRINT "149,760,M,910,815"
1620 PRINT #1:PRINT "150,765,F,885,785"
1630 PRINT #1:PRINT "151,770,M,920,825"
1640 PRINT #1:PRINT "152,775,F,895,795"
1650 PRINT #1:PRINT "153,780,M,930,835"
1660 PRINT #1:PRINT "154,785,F,905,805"
1670 PRINT #1:PRINT "155,790,M,940,845"
1680 PRINT #1:PRINT "156,795,F,915,815"
1690 PRINT #1:PRINT "157,800,M,950,855"
1700 PRINT #1:PRINT "158,805,F,925,825"
1710 PRINT #1:PRINT "159,810,M,960,865"
1720 PRINT #1:PRINT "160,815,F,935,835"
1730 PRINT #1:PRINT "161,820,M,970,875"
1740 PRINT #1:PRINT "162,825,F,945,845"
1750 PRINT #1:PRINT "163,830,M,980,885"
1760 PRINT #1:PRINT "164,835,F,955,855"
1770 PRINT #1:PRINT "165,840,M,990,895"
1780 PRINT #1:PRINT "166,845,F,965,865"
1790 PRINT #1:PRINT "167,850,M,1000,905"
1800 PRINT #1:PRINT "168,855,F,975,875"
1810 PRINT #1:PRINT "169,860,M,1010,915"
1820 PRINT #1:PRINT "170,865,F,985,885"
1830 PRINT #1:PRINT "171,870,M,1020,925"
1840 PRINT #1:PRINT "172,875,F,995,895"
1850 PRINT #1:PRINT "173,880,M,1030,935"
1860 PRINT #1:PRINT "174,885,F,1005,905"
1870 PRINT #1:PRINT "175,890,M,1040,945"
1880 PRINT #1:PRINT "176,895,F,1015,915"
1890 PRINT #1:PRINT "177,900,M,1050,955"
1900 PRINT #1:PRINT "178,905,F,1025,925"
1910 PRINT #1:PRINT "179,910,M,1060,965"
1920 PRINT #1:PRINT "180,915,F,1035,935"
1930 PRINT #1:PRINT "181,920,M,1070,975"
1940 PRINT #1:PRINT "182,925,F,1045,945"
1950 PRINT #1:PRINT "183,930,M,1080,985"
1960 PRINT #1:PRINT "184,935,F,1055,955"
1970 PRINT #1:PRINT "185,940,M,1090,995"
1980 PRINT #1:PRINT "186,945,F,1065,965"
1990 PRINT #1:PRINT "187,950,M,1100,1005"
2000 PRINT #1:PRINT "188,955,F,1075,975"
2010 PRINT #1:PRINT "189,960,M,1110,1015"
2020 PRINT #1:PRINT "190,965,F,1085,985"
2030 PRINT #1:PRINT "191,970,M,1120,1025"
2040 PRINT #1:PRINT "192,975,F,1095,995"
2050 PRINT #1:PRINT "193,980,M,1130,1035"
2060 PRINT #1:PRINT "194,985,F,1105,1005"
2070 PRINT #1:PRINT "195,990,M,1140,1045"
2080 PRINT #1:PRINT "196,995,F,1115,1015"
2090 PRINT #1:PRINT "197,1000,M,1150,1055"
2100 PRINT #1:PRINT "198,1005,F,1125,1025"
2110 PRINT #1:PRINT "199,1010,M,1160,1065"
2120 PRINT #1:PRINT "200,1015,F,1135,1035"
2130 PRINT #1:PRINT "201,1020,M,1170,1075"
2140 PRINT #1:PRINT "202,1025,F,1145,1045"
2150 PRINT #1:PRINT "203,1030,M,1180,1085"
2160 PRINT #1:PRINT "204,1035,F,1155,1055"
2170 PRINT #1:PRINT "205,1040,M,1190,1095"
2180 PRINT #1:PRINT "206,1045,F,1165,1065"
2190 PRINT #1:PRINT "207,1050,M,1200,1105"
2200 PRINT #1:PRINT "208,1055,F,1175,1075"
2210 PRINT #1:PRINT "209,1060,M,1210,1115"
2220 PRINT #1:PRINT "210,1065,F,1185,1085"
2230 PRINT #1:PRINT "211,1070,M,1220,1125"
2240 PRINT #1:PRINT "212,1075,F,1195,1095"
2250 PRINT #1:PRINT "213,1080,M,1230,1135"
2260 PRINT #1:PRINT "214,1085,F,1205,1105"
2270 PRINT #1:PRINT "215,1090,M,1240,1145"
2280 PRINT #1:PRINT "216,1095,F,1215,1115"
2290 PRINT #1:PRINT "217,1100,M,1250,1155"
2300 PRINT #1:PRINT "218,1105,F,1225,1125"
2310 PRINT #1:PRINT "219,1110,M,1260,1165"
2320 PRINT #1:PRINT "220,1115,F,1235,1135"
2330 PRINT #1:PRINT "221,1120,M,1270,1175"
2340 PRINT #1:PRINT "222,1125,F,1245,1145"
2350 PRINT #1:PRINT "223,1130,M,1280,1185"
2360 PRINT #1:PRINT "224,1135,F,1255,1155"
2370 PRINT #1:PRINT "225,1140,M,1290,1195"
2380 PRINT #1:PRINT "226,1145,F,1265,1165"
2390 PRINT #1:PRINT "227,1150,M,1300,1205"
2400 PRINT #1:PRINT "228,1155,F,1275,1175"
2410 PRINT #1:PRINT "229,1160,M,1310,1215"
2420 PRINT #1:PRINT "230,1165,F,1285,1185"
2430 PRINT #1:PRINT "231,1170,M,1320,1225"
2440 PRINT #1:PRINT "232,1175,F,1295,1195"
2450 PRINT #1:PRINT "233,1180,M,1330,1235"
2460 PRINT #1:PRINT "234,1185,F,1305,1205"
2470 PRINT #1:PRINT "235,1190,M,1340,1245"
2480 PRINT #1:PRINT "236,1195,F,1315,1215"
2490 PRINT #1:PRINT "237,1200,M,1350,1255"
2500 PRINT #1:PRINT "238,1205,F,1325,1225"
2510 PRINT #1:PRINT "239,1210,M,1360,1265"
2520 PRINT #1:PRINT "240,1215,F,1335,1235"
2530 PRINT #1:PRINT "241,1220,M,1370,1275"
2540 PRINT #1:PRINT "242,1225,F,1345,1245"
2550 PRINT #1:PRINT "243,1230,M,1380,1285"
2560 PRINT #1:PRINT "244,1235,F,1355,1255"
2570 PRINT #1:PRINT "245,1240,M,1390,1295"
2580 PRINT #1:PRINT "246,1245,F,1365,1265"
2590 PRINT #1:PRINT "247,1250,M,1400,1305"
2600 PRINT #1:PRINT "248,1255,F,1375,1275"
2610 PRINT #1:PRINT "249,1260,M,1410,1315"
2620 PRINT #1:PRINT "250,1265,F,1385,1285"
2630 PRINT #1:PRINT "251,1270,M,1420,1325"
2640 PRINT #1:PRINT "252,1275,F,1395,1295"
2650 PRINT #1:PRINT "253,1280,M,1430,1335"
2660 PRINT #1:PRINT "254,1285,F,1405,1305"
2670 PRINT #1:PRINT "255,1290,M,1440,1345"
2680 PRINT #1:PRINT "256,1295,F,1415,1315"
2690 PRINT #1:PRINT "257,1300,M,1450,1355"
2700 PRINT #1:PRINT "258,1305,F,1425,1325"
2710 PRINT #1:PRINT "259,1310,M,1460,1365"
2720 PRINT #1:PRINT "260,1315,F,1435,1335"
2730 PRINT #1:PRINT "261,1320,M,1470,1375"
2740 PRINT #1:PRINT "262,1325,F,1445,1345"
2750 PRINT #1:PRINT "263,1330,M,1480,1385"
2760 PRINT #1:PRINT "264,1335,F,1455,1355"
2770 PRINT #1:PRINT "265,1340,M,1490,1395"
2780 PRINT #1:PRINT "266,1345,F,1465,1365"
2790 PRINT #1:PRINT "267,1350,M,1500,1405"
2800 PRINT #1:PRINT "268,1355,F,1475,1375"
2810 PRINT #1:PRINT "269,1360,M,1510,1415"
2820 PRINT #1:PRINT "270,1365,F,1485,1385"
2830 PRINT #1:PRINT "271,1370,M,1520,1425"
2840 PRINT #1:PRINT "272,1375,F,1495,1395"
2850 PRINT #1:PRINT "273,1380,M,1530,1435"
2860 PRINT #1:PRINT "274,1385,F,1505,1405"
2870 PRINT #1:PRINT "275,1390,M,1540,1445"
2880 PRINT #1:PRINT "276,1395,F,1515,1415"
2890 PRINT #1:PRINT "277,1400,M,1550,1455"
2900 PRINT #1:PRINT "278,1405,F,1525,1425"
2910 PRINT #1:PRINT "279,1410,M,1560,1465"
2920 PRINT #1:PRINT "280,1415,F,1535,1435"
2930 PRINT #1:PRINT "281,1420,M,1570,1475"
2940 PRINT #1:PRINT "282,1425,F,1545,1445"
2950 PRINT #1:PRINT "283,1430,M,1580,1485"
2960 PRINT #1:PRINT "284,1435,F,1555,1455"
2970 PRINT #1:PRINT "285,1440,M,1590,1495"
2980 PRINT #1:PRINT "286,1445,F,1565,1465"
2990 PRINT #1:PRINT "287,1450,M,1600,1505"
3000 PRINT #1:PRINT "288,1455,F,1575,1475"
3010 PRINT #1:PRINT "289,1460,M,1610,1515"
3020 PRINT #1:PRINT "290,1465,F,1585,1485"
3030 PRINT #1:PRINT "291,1470,M,1620,1525"
3040 PRINT #1:PRINT "292,1475,F,1595,1495"
3050 PRINT #1:PRINT "293,1480,M,1630,1535"
3060 PRINT #1:PRINT "294,1485,F,1605,1505"
3070 PRINT #1:PRINT "295,1490,M,1640,1545"
3080 PRINT #1:PRINT "296,1495,F,1615,1515"
3090 PRINT #1:PRINT "297,1500,M,1650,1555"
3100 PRINT #1:PRINT "298,1505,F,1625,1525"
3110 PRINT #1:PRINT "299,1510,M,1660,1565"
3120 PRINT #1:PRINT "300,1515,F,1635,1535"
3130 PRINT #1:PRINT "301,1520,M,1670,1575"
3140 PRINT #1:PRINT "302,1525,F,1645,1545"
3150 PRINT #1:PRINT "303,1530,M,1680,1585"
3160 PRINT #1:PRINT "304,1535,F,1655,1555"
3170 PRINT #1:PRINT "305,1540,M,1690,1595"
3180 PRINT #1:PRINT "306,1545,F,1665,1565"
3190 PRINT #1:PRINT "307,1550,M,1700,1605"
3200 PRINT #1:PRINT "308,1555,F,1675,1575"
3210 PRINT #1:PRINT "309,1560,M,1710,1615"
3220 PRINT #1:PRINT "310,1565,F,1685,1585"
3230 PRINT #1:PRINT "311,1570,M,1720,1625"
3240 PRINT #1:PRINT "312,1575,F,1695,1595"
3250 PRINT #1:PRINT "313,1580,M,1730,1635"
3260 PRINT #1:PRINT "314,1585,F,1705,1605"
3270 PRINT #1:PRINT "315,1590,M,1740,1645"
3280 PRINT #1:PRINT "316,1595,F,1715,1615"
3290 PRINT #1:PRINT "317,1600,M,1750,1655"
3300 PRINT #1:PRINT "318,1605,F,1725,1625"
3310 PRINT #1:PRINT "319,1610,M,1760,1665"
3320 PRINT #1:PRINT "320,1615,F,1735,1635"
3330 PRINT #1:PRINT "321,1620,M,1770,1675"
3340 PRINT #1:PRINT "322,1625,F,1745,1645"
3350 PRINT #1:PRINT "323,1630,M,1780,1685"
3360 PRINT #1:PRINT "324,1635,F,1755,1655"
3370 PRINT #1:PRINT "325,1640,M,1790,1695"
3380 PRINT #1:PRINT "326,1645,F,1765,1665"
3390 PRINT #1:PRINT "327,1650,M,1800,1705"
3400 PRINT #1:PRINT "328,1655,F,1775,1675"
3410 PRINT #1:PRINT "329,1660,M,1810,1715"
3420 PRINT #1:PRINT "330,1665,F,1785,1685"
3430 PRINT #1:PRINT "331,1670,M,1820,1725"
3440 PRINT #1:PRINT "332,1675,F,1795,1695"
3450 PRINT #1:PRINT "333,1680,M,1830,1735"
3460 PRINT #1:PRINT "334,1685,F,1805,1705"
3470 PRINT #1:PRINT "335,1690,M,1840,1745"
3480 PRINT #1:PRINT "336,1695,F,1815,1715"
3490 PRINT #1:PRINT "337,1700,M,1850,1755"
3500 PRINT #1:PRINT "338,1705,F,1825,1725"
3510 PRINT #1:PRINT "339,1710,M,1860,1765"
3520 PRINT #1:PRINT "340,1715,F,1835,1735"
3530 PRINT #1:PRINT "341,1720,M,1870,1775"
3540 PRINT #1:PRINT "342,1725,F,1845,1745"
3550 PRINT #1:PRINT "343,1730,M,1880,1785"
3560 PRINT #1:PRINT "344,1735,F,1855,1755"
3570 PRINT #1:PRINT "345,1740,M,1890,1795"
3580 PRINT #1:PRINT "346,1745,F,1865,1765"
3590 PRINT #1:PRINT "347,1750,M,1900,1805"
3600 PRINT #1:PRINT "348,1755,F,1875,1775"
3610 PRINT #1:PRINT "349,1760,M,1910,1815"
3620 PRINT #1:PRINT "350,1765,F,1885,1785"
3630 PRINT #1:PRINT "351,1770,M,1920,1825"
3640 PRINT #1:PRINT "352,1775,F,1895,1795"
3650 PRINT #1:PRINT "353,1780,M,1930,1835"
3660 PRINT #1:PRINT "354,1785,F,1905,1805"
3670 PRINT #1:PRINT "355,1790,M,1940,1845"
3680 PRINT #1:PRINT "356,1795,F,1915,1815"
3690 PRINT #1:PRINT "357,1800,M,1950,1855"
3700 PRINT #1:PRINT "358,1805,F,1925,1825"
3710 PRINT #1:PRINT "359,1810,M,1960,1865"
3720 PRINT #1:PRINT "360,1815,F,1935,1835"
3730 PRINT #1:PRINT "361,1820,M,1970,1875"
3740 PRINT #1:PRINT "362,1825,F,1945,1845"
3750 PRINT #1:PRINT "363,1830,M,1980,1885"
3760 PRINT #1:PRINT "364,1835,F,1955,1855"
3770 PRINT #1:PRINT "365,1840,M,1990,1895"
3780 PRINT #1:PRINT "366,1845,F,1965,1865"
3790 PRINT #1:PRINT "367,1850,M,2000,1905"
3800 PRINT #1:PRINT "368,1855,F,1975,1875"
3810 PRINT #1:PRINT "369,1860,M,2010,1915"
3820 PRINT #1:PRINT "370,1865,F,1985,1885"
3830 PRINT #1:PRINT "371,1870,M,2020,1925"
3840 PRINT #1:PRINT "372,1875,F,1995,1895"
3850 PRINT #1:PRINT "373,1880,M,2030,1935"
3860 PRINT #1:PRINT "374,1885,F,2005,1905"
3870 PRINT #1:PRINT "375,1890,M,2040,1945"
3880 PRINT #1:PRINT "376,1895,F,2015,1915"
3890 PRINT #1:PRINT "377,1900,M,2050,1955"
3900 PRINT #1:PRINT "378,1905,F,2025,1925"
3910 PRINT #1:PRINT "379,1910,M,2060,1965"
3920 PRINT #1:PRINT "380,1915,F,2035,1935"
3930 PRINT #1:PRINT "381,1920,M,2070,1975"
3940 PRINT #1:PRINT "382,1925,F,2045,1945"
3950 PRINT #1:PRINT "383,1930,M,2080,1985"
3960 PRINT #1:PRINT "384,1935,F,2055,1955"
3970 PRINT #1:PRINT "385,1940,M,2090,1995"
3980 PRINT #1:PRINT "386,1945,F,2065,1965"
3990 PRINT #1:PRINT "387,1950,M,2100,2005"
4000 PRINT #1:PRINT "388,1955,F,2075,1975"
4010 PRINT #1:PRINT "389,1960,M,2110,2015"
4020 PRINT #1:PRINT "390,1965,F,2085,1985"
4030 PRINT #1:PRINT "391,1970,M,2120,2025"
4040 PRINT #1:PRINT "392,1975,F,2095,1995"
4050 PRINT #1:PRINT "393,1980,M,2130,2035"
4060 PRINT #1:PRINT "394,1985,F,2105,2005"
4070 PRINT #1:PRINT "395,1990,M,2140,2045"
4080 PRINT #1:PRINT "396,1995,F,2115,2015"
4090 PRINT #1:PRINT "397,2000,M,2150,2055"
4100 PRINT #1:PRINT "398,2005,F,2125,2025"
4110 PRINT #1:PRINT "399,2010,M,2160,2065"
4120 PRINT #1:PRINT "400,2015,F,2135,2035"
4130 PRINT #1:PRINT "401,2020,M,2170,2075"
4140 PRINT #1:PRINT "402,2025,F,2145,2045"
4150 PRINT #1:PRINT "403,2030,M,2180,2085"
4160 PRINT #1:PRINT "404,2035,F,2155,2055"
4170 PRINT #1:PRINT "405,2040,M,2190,2095"
4180 PRINT #1:PRINT "406,2045,F,2165,2065"
4190 PRINT #1:PRINT "407,2050,M,2200,2105"
4200 PRINT #1:PRINT "408,2055,F,2175,2075"
4210 PRINT #1:PRINT "409,2060,M,2210,2115"
4220 PRINT #1:PRINT "410,2065,F,2185,2085"
4230 PRINT #1:PRINT "411,2070,M,2220,2125"
4240 PRINT #1:PRINT "412,2075,F,2195,2095"
4250 PRINT #1:PRINT "413,2080,M,2230,2135"
4260 PRINT #1:PRINT "414,2085,F,2205,2105"
4270 PRINT #1:PRINT "415,2090,M,2240,2145"
4280 PRINT #1:PRINT "416,2095,F,2215,2115"
4290 PRINT #1:PRINT "417,2100,M,2250,2155
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Letters

The page in Your Commodore written by our readers for our readers.

Neglected C16

I am writing with reference to R. Jones's letter in the November issue of *Your Commodore*.

R. Jones wrote regarding the lack of magazines for the C16. I buy two Commodore magazines, one of which is *Your Commodore* (both give the C16 a fair chance but if you buy any magazine you should expect it to be dominated with articles for the C64).

There is a magazine available which caters for just the C16 and Plus/4 but it is only obtainable by mail order subscription. The fee is £10 (£15 overseas) and it features reviews of hardware and software. Club members are allowed free classified ads and club mailings throughout the year. It's a monthly magazine so that's not bad for a token is it? Chiquis, postal orders or international money orders should be sent to: Micro-C16/Plus 4 User Club, (26 User), Micro Media, 42 Mount Street, Cardiff, Llanur-din ML4 5ER.

Also, if any C16/Plus/4 owners are interested in user defined character sets they can send me an SAI and I will send a copy on tape.

If Ashtons, 27 College Glade, Carlisle, Great NPS ITE.

Nationwide Club

Perhaps *Your Commodore* would be interested to know about the recent formation of The National Computer Club. As Mr Humphrey pointed out in November's mailing, other magazines have moved towards game playing and away from real computing. Unfortunately, localised computer clubs have, all too often, done the same thing. Consequently, computer hobbyists have tended to drift away and their expertise has gone with them. This has left large numbers of enthusiasts without the personal contact with other enthusiasts that promotes and development of ideas needs.

The National Computer Club

(NCC) is seeking to fill the gap by providing all the benefits of a local computing club but on a nationwide scale, giving members the benefit of personal contact with a large pool of knowledge, expertise and experience.

Our aim is to produce an environment, within the club, where members can contact one another to find solutions to problems, answers to queries or to form computing relationships with other, like-minded, members.

The club caters for all levels of expertise from beginner to experts and for all machines - even home built. This is important because we view computing as 'computing' and not 'Spectruming', 'Commodore Ming' or even 'Beebing'. No disrespect intended since most of us limit our computing to just one machine, but instead, within the overall term 'computing', range from basic programming right through to machine building and a great deal of information and programming (with modifications) is applicable to all machines, e.g. address decoding, machine code flow charts, etc.

The NCC is a 'computing' club and therefore caters for all computing interests. Of course a Commodore user, thinking of buying a particular program, might want to hear the views of others who already have the program. In the NCC, he can ask them. I should add that the excellent hobby of games writing is a part of the NCC, but games playing, on its own, is not. However, players who wish to move into computing are very welcome.

The way that members make contact with others whether for help or for computing relationships is through our monthly bulletin which is for the free use of members. Included in it are: rules, wants, queries (could be difficulties or general interest), general projects, items of interest such as utility routines, techniques, etc. and whatever else the members would like to say. For instance somebody might need the pin-out of a particular logic chip. He could ask for it in the Bulletin and other members who just happen to

have that information would send it directly to him. He might also have stated what he is doing, etc and asked for others who are doing the same to get in touch for the sharing of information and mutual progression.

Finally, for a more LAF, I would be pleased to send further details of the NCC to any of your readers.

Philip Cohen, NEC, 373 Dudley Hill Road, Bradford BD7 3DP.

International Club

I am a reader of *Your Commodore* and I have founded, with two other people, a Commodore user club for C64 and C128 owners (disk drive only).

We have approximately 20 members in Switzerland, France, Belgium and one in Norway. We would like to get in touch with users in the UK and USA. If any *Your Commodore* readers are interested we would be very pleased to hear from them. We would also like to hear from other Commodore computer clubs.

P. Suglen, Interclub Geneva, 78 Rue de St Jean, 1201 Geneva, Switzerland.

Giveaway Success

I very rarely write a letter to a computer magazine, but I think *Your Commodore* deserves one. Firstly because of the free tape you supplied with the November issue.

The game RI DI was brilliant, great graphics, good sound and very addictive gameplay. It was better than a lot of games I have bought from the shops. I think the author of the game, Tony Corradini deserves a lot of credit.

May I also thank you for including information and software for the C128, as I have recently bought a Commodore 128. *Your Commodore* seems to be the only magazine with sufficient coverage of this computer.

Well done, thank you for a fabulous magazine.
Paul Newport, Bristol.

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DISCLAIMER: Also mention all the DON'T'S, COULDS, etc. Always part of a compromise to be remembered or displayed.

HANDOUT: Politics and Democracy

100

Editorial Board

[illegible]

Figure 1. Study design.

Review all of your Commission's materials detailing the programming and content of *Barney's Diner* (including the program's website).

A. Asensio, C. Campare, D. Desmardes, P. Fils, G. Gay, H. Haug, J. Imbert, J. Jung, L. Lourt, M. Memory, P. Petri, B. Rogstad, S. Serre, T. Tronche, V. Vasily, W. Webb, A. Wolf, S. Zlotnik, D. Zlotnik

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

Consistent with the stated objectives of the study, the

The **FAO2** COME function automatically distinguishes between **WHS2** and **LOPES**. Multi-colour graphics are converted into greyscale plots. The **PRINT** functions allow you to decide on Large/Small and Normal/Minimise print sizes.

1000

Please Read Instructions and **DO NOT** ignore an alarm. **CONTING** - Address you to return to your program. **SAFE** - Return to BASIC. **RESET** - Restart. **TOTAL** - End of program.

DISK COMMANDS: Copy the contents of the memory onto a disk. The program must be released first, with **RELEASE** followed by **DISK**. **RELEASE** **DISK** **FILE** **NAME**

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7. What Was the Outcome?
 The study found that the
 use of the program led to
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 answers. The results
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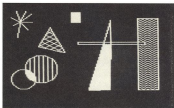
Making Light Work

C16 and Plus/4 owners should read on to find out just how good is the Trojan Lightpen for the computer.

By Gordon Hamlett

Building Pleasors everywhere can now create their own designs on their computers. The CAD-Master pack (CAD = Computer Aided Design) for the C16 and Plus/4 machines is a light pen based system and comes complete with menu driven software and special adaptor. Setting up the system is very straightforward. The adaptor plugs into the joystick port and converts the non-standard circular Commodore port into the more normal D-type socket. There are two versions of the program - one for each machine so it is necessary to make sure that you load in the correct one - especially as the Plus/4 will load both and there is a considerable difference in the number of functions available. The review will concentrate on the Plus/4 version unless otherwise specified.

After loading, you are presented with a menu screen detailing the different shapes, pen widths and colours available to you. Selecting an option is simply a case of pointing the light pen to the appropriate area of the screen. You can draw on screen in a variety of styles. Thick and thin lines, solid or dotted and three different thicknesses of hatching. Drawing freehand is hardly slow and pernickety and takes considerable practice to master. Any joystick or trackball system could beat the light pen hands down. Shape drawing is considerably easier. Select the shape or pattern from the menu - you can select from boxes, hatching, rays, lines, triangles and circles. Position the light pen in the approximate



position on the screen where you want the shape and press the control key. The screen flashes and a dot appears where your light pen was. This can now be finely adjusted using the cursor keys and the process repeated for, say, the other two points of the triangle.

Areas of your design can be copied elsewhere on the screen, doubling either or both of height and width if required. Areas of the screen can be filled in with different colours although care should be taken that the design does not 'leak' - the area must be enclosed by solid lines. There is an erase function if you do make a mistake. Judicious use of the three

available pens and the wash function should be made in order to avoid colour clashes in intersections of lines and shapes. Text can also be included in your pictures should you wish to caption them.

Having considerably less memory to play with, the C16 version is written in only 2K. Naturally, there is no room for certain functions and the ones omitted were the freehand drawing and associated options such as styles etc. One feature not included in the Plus/4 version is the ability to draw either a circle or an ellipse. The manual, which is generally poor, is decidedly dreadful here. Apart from

connecting one calling ellipse and ellipse? There is also the following piece of code. Having positioned the centre of the circle, the second point selected in the CIRCLE must be at 45 degrees to the first point so an CIRCLE(1,2) will be drawn. The problem is that two points can never be at an angle to each other – they are joined by a straight line so the above is nonsensical. What I think they meant to say was that if you imagine a vertical line drawn through the first dot, then the second dot on subtending an angle of 45 degrees to that line. In other words, if north is at the top of the screen, then you get a circle if the second dot is at SW, NE, SE or SW. Anywhere else results in an ellipse.

Using the light pen itself, is an acquired art. You don't need to apply pressure but you do have to make sure that the pen is flush with the screen - not always easy with a curved screen. My own personal experience is that they are actually quite cumbersome to use.

```

TROJAN LIGHTPCN (C)1988

TRIM  █ BOX    █ BRAN  █ MEN   █  █  █  █
GILL1 █ BANG.  █ BRSH  █ ERASE █  █  █  █
GILL2 █ BAVE   █ COPY  █ BORDE █  █  █  █
GILL3 █ LINE   █ MAGN  █ ORI.T  █  █  █  █
THICK █ TRIA.  █ SAVE  █ PEN1  █  █  █  █
ROOT  █ CIRD.  █ LOAD  █ PEN2  █  █  █  █
VOGT  █ FILL  █ PRINT █ PEN3  █  █  █  █
DOTL1 █ TEST   █ LOCK  █ BACK  █  █  █  █

      PLUS/4 VERSION 1.0

```

and offer no advantage whatsoever over traditional graphic packages. The advent of the mouse or even the humble joystick has all but killed their use for computer applications. It is only as bar code readers have they found any great commercial value. Post documentation and software (1987).

program crashed on the half way through a picture with army problems, mean that this package cannot be recommended.

100

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Listings

*Get it right first time with our deluxe program system
for the C64.*

You may have noticed that our listings are free of those horrible little black blinks which send you searching around the keyboard for a suitable graphic symbol. You may also have noted the funny numbers by the side of each line of the listing. For no reason, it's all part of our easy entry and.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an arc of squares in layman's terms, and [SA,R] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

More than two spaces appear in a statement then this will be printed as [SPC4] or, more properly, [RSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE,FLICK]

This would be achieved by holding

down the CTRL key as you press N, press the cursor key five times, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F) key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in colour).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[S8],[C7]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT + 2) and delete it. This puts the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON9), type the relevant number of inverted Ts and then hold down CTRL and press zero (RVSCOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

..CC=2*[PI]*R;

Ignore the square brackets and just type in a shifted upward pointing arrow (i.e. the pi symbol).

PROGRAM: PRINTS: D=CC=2PI

1. NEW DELUXE COMMANDS - PRINT SYMBOLS

```
10 IF=110 [LH=72] [R=2000]
20 FOR I=1 TO 10:PRINT FOR I=2 TO 10
30 READ A:IF A=0 GOTO 100:PRINT A:GOTO 10
40 IF A=1 GOTO 100:PRINT A:GOTO 10
50 IF A=2 GOTO 100:PRINT A:GOTO 10
60 IF A=3 GOTO 100:PRINT A:GOTO 10
70 IF A=4 GOTO 100:PRINT A:GOTO 10
80 IF A=5 GOTO 100:PRINT A:GOTO 10
90 IF A=6 GOTO 100:PRINT A:GOTO 10
100 GOTO 100:PRINT A:GOTO 10
110 GOTO 100:PRINT A:GOTO 10
120 GOTO 100:PRINT A:GOTO 10
130 GOTO 100:PRINT A:GOTO 10
140 GOTO 100:PRINT A:GOTO 10
150 GOTO 100:PRINT A:GOTO 10
160 GOTO 100:PRINT A:GOTO 10
170 GOTO 100:PRINT A:GOTO 10
180 GOTO 100:PRINT A:GOTO 10
190 GOTO 100:PRINT A:GOTO 10
200 GOTO 100:PRINT A:GOTO 10
```

```
100 GOTO 100:PRINT A:GOTO 10
110 GOTO 100:PRINT A:GOTO 10
120 GOTO 100:PRINT A:GOTO 10
130 GOTO 100:PRINT A:GOTO 10
140 GOTO 100:PRINT A:GOTO 10
150 GOTO 100:PRINT A:GOTO 10
160 GOTO 100:PRINT A:GOTO 10
170 GOTO 100:PRINT A:GOTO 10
180 GOTO 100:PRINT A:GOTO 10
190 GOTO 100:PRINT A:GOTO 10
200 GOTO 100:PRINT A:GOTO 10
```

By Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk

immediately because it will be used with most of the programs and future listings appearing in *Your Commodore*.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and

















press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

















No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing!

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Macros Symbol Keypress

[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		F1 key
[F2]		SHIFT & F1 key
[F3]		F3 key
[F4]		SHIFT & F3 key
[F5]		F5 key
[F6]		SHIFT & F5 key
[F7]		F7 key
[F8]		SHIFT & F7 key
[HOME]		CLE/HOME
[CLR]		SHIFT & CLE/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Macros Symbol Keypress

[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[FOUND]		F
[LARBOW]		←
[UPARROW]		↑
[F1]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		rev key
[Clear]		CBM + clear
[Shift]		SHIFT + letter

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C16 Software Offer

May it never be said that we don't listen to our readers' requests. Due to great demand we are pleased to announce the start of Your Commodore software for C16 and Plus/4 owners.

Due to the great length and complexity of the programs that are available in Your Commodore we provide a Software Service that makes all of the software from each month available on disk or cassette. Unfortunately until now we have not been able to provide C16 and Plus/4 owners with cassettes, only disk. We are therefore extremely pleased to announce that we will now be making cassettes available to readers of the magazine who own C16s or Plus/4s together with a disk option that will contain only programs for these machines.

Versions of the disk or tape will be made available approximately every three months, or when we think that we have collected enough material to make them useful to you. Unfortunately this does mean that you may have to wait a few months for some of the software, but I'm sure that you will think it is worth the wait.

The cost of this service is the same as the tapes and disks for the C16 and C128, that's just £4.00 for cassette or £6.00 for disk.

What Do You Get?

The first of these C16 Specials contains what we think is the best and most useful material that we have published over the last few months. We don't

supply instructions with the cassettes since you should have these in the relevant magazines and this helps to keep the cost down. Should you not have any of the back numbers then these are available from the following address:

INFONET LTD, Times House, 179
The Markways, Hemel Hempstead,
Herts, HP1 1BB
Tel: (0462) 46415.

please contact this address for prices and availability.

A set of photocopied instructions will also be made available for £1.50 should you want purchase the magazines. These photocopies are available from:

C16 SPECIAL A PHOTOCOPIES
Your Commodore
1 Golden Square
London W1R 3AR

Full Speed Ahead

As you are all no doubt aware the cassette loading and saving on the C16 and Plus/4 is extremely slow. In the February 1986 issue of the magazine we published a routine that will allow you to save your own programs at 10 times the normal speed. This program

has proved to be one of our most popular programs for these machines.

Character Generator

The C16 and Plus/4 computers allow you to re-define the character set. This extremely useful program allows you to do this with ease and then save your results for use at a later date. From April 1986.

C16 Synth

This program was published as part of our Programming the C16-series. It has proved extremely popular and has been used to great effect by a number of people. Basically the program allows you to generate music on your C16 that is run independently of any programs allowing to add music to your own programming masterpieces. From May 1986.

C16 Assembler

No doubt many of you will have played around with a little machine code. The C16 and Plus/4 have built in monitors that makes this extremely easy. By adding this program to your collection you will be able to write your own assembler programs with greater ease. From June 1986.

The Monitor Returns

All work and no play is bad for you so we've included this adventure from our July 1986 issue for your enjoyment.

Sound Sampler

Make your computer sound like any instrument you like. With this program you can record any sound and then alter it with your computer, you can even play it backwards. OK so it may not be up to studio quality but it is great fun. From November 1985.

Plus/4 Assembler

This program not only gives you Plus/4 a great assembler but it also adds some extremely powerful commands to the Basic, including a merge routine. From December 1985.

This Issue

As well as all of the above we will of course be including any Plus/4 or C16 programs that appear in this issue of the magazine on the disk and tape.

Please Note

The Commodore Plus/4 computer is compatible with the C16 ROM, so some people have been informed, the C64 Plus/4 programs will not work on the C16 but C16 programs will work on a Plus/4.

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Carte Blanche

The cartridge revolution has saturated the market with many variations around a theme. Your Commodore blows the lid off these mysterious little packages.

By Eric Doyle

Once upon a time the main company producing cartridges for the C64 was Commodore itself, closely followed by Supersoft. Apart from Simon's Basic, most of C64's output was games. Supersoft specialised in the excellent monitor screen but no-one else really cared.

Suddenly there's a glut of these boxes on the market. Let's consider what the ideal cartridge should contain and we have a few of the most popular ones measured up.

For most people it seems that a turbo tape-to-disk back-up facility is vital but most serious users would also insist upon a code monitor. Basic extensions should be limited to useful commands (numbers, merge, delete etc.) so that any programs developed will be transportable from machine to machine, regardless of the cartridge's presence.

Technically the cartridge should be 'transparent' to the standard C64 so that it will surely have to be removed. For the same reason the addition of a reset and cartridge on/off switch is highly desirable.

The cartridges we will be looking at are *Force Frame*, *QuickDisk*, the *Expert*, *Power Cartridge*, *Ultaman*, *Roboco* 30, *Arjen Replay* and the *Joist* Cartridge. There is also a very special utility which doesn't fall into the cartridge category, but more of that later.

Force Frame

Everann Micras produces *Force Frame* and *QuickDisk* as separate units. *Force Frame* is purely a disk or tape backup utility and, as the instruction leaflet points out, is strictly for personal use only. This area of cartridge usage intensely irritates the software manufacturers for some reason or other. Personally, I feel that dual-disk cassette recorders are responsible for the majority of back-street piracy that goes on. What is disturbing is the fact that European prices are using

this kind of disk utility to put games on to modem-linked networks. Surely it would be possible to produce cartridges with individual identity numbers (like the system which Commodore's Companion monitors) so that the cartridge must be present when the program is run.

Force Frame is a very simple product to use. When the computer is powered up you are faced with the Basic instruction screen. Simply by pressing the return key, the machine reverts into normal power-up mode. The program to be backed-up is then loaded and then at a convenient point the reset button on the cartridge is pressed and you then choose one of the three options for a memory save. This can be in turbo-disk, turbo-tape or normal disk format.

The days of the back-up cartridge are numbered as more and more commercial software checks for copied cartridges in a similar way as they look for a disk drive's presence.

QuickDisk

This cartridge does what it claims and very little more. It provides a fast load and save facility as well as making standard disk commands more easily accessible. This avoids the usual rituals of opening and closing files. Disk directories can be displayed directly to the screen without affecting any program which is currently in memory.

Compared to most of the packages it is pricey for what it does and a combination of *Force Frame* and *QuickDisk* would probably make a more reasonable package.

The Expert

One way to try to defeat the cartridge buyers is to have a 'soft' cartridge. The *Expert* is one such device. It contains RAM memory which must be booted up from disk before use. This means

that the cartridge can be modernised easily and cheaply by buying the latest update disk as and when necessary.

The *Expert* contains the expected turbo-disk back-up facility but there is also a very useful monitor which allows you to examine any part of the computer's memory whenever inside the computer is in. This means that the cartridge will still operate even if the ROMs are switched out.

Modern cartridges only use a 'word' of a few bytes of memory so that they can interrupt the machine's normal operation on request. Sometimes a program requires the same memory bytes for programming space. This is why some things cannot be saved by certain 'hard' cartridges. With the *Expert* the word(s) can be relocated with a simple command to avoid any clashes with software.

The main disadvantage of the *Expert* stems from its RAM based nature. Occasionally I've found that the memory can be corrupted so that the monitor fails to operate correctly. The only way out of such a problem is to power down, re-boot the cartridge and try again. All very time consuming.

Power Cartridge

This is currently one of my favourite devices for its ease of use and range of facilities. My only vague criticism is the bright red plastic casing which makes it look a little tacky.

With this unit connected you have a Basic extension, monitor, back-up and shelve screen dump facility at your fingertips.

The high resolution screen dumps can be selected in one of two sizes. A4 format or postcard size. The dump uses shading to represent different colours and the printer can be reversed to give a 'negative' image if preferred.

The machine code monitor and Basic loader commands add the missing essentials to the 64's ROM

routines and the screen menu is easy to understand and use.

Ultimon

This is a convenience of a utility for the Atari and is really just a program stored on cartridge. When you switch the computer on the memory is filled from the cartridge and the program is stored by a SYS command.

The program is a disk monitor which, although sophisticated, is old fashioned. Although most of the external cartridge monitors don't reach the standard of this machine, they do have the advantage of taking up very little space in the computer's memory.

I found the instruction manual with the Ultimon cartridge to be difficult to follow and given up when I found that I couldn't get some of the commands to work. There are a lot better monitor cartridges than this and I suggest you look at SuperSoft's Zoom in preference.

Robocom 50

Although the Robocom cartridge is dumped into the C64's memory in the same way as Ultimon, it does take advantage of the addresslock facility. This brings in a substantial Basic toolkit and the monitor can be placed almost anywhere in free RAM by a simple command.

The cartridge offers a useful range of turbo-disk and turbo-tape commands. These are backed up by a very useful tape alignment facility and an alignment tape is provided with the package. This is an area all the other turbo-tape programs ignore and is a valuable provision knowing how accurate the automatic alignment must be for the successful load.

The disadvantage of both Ultimon and Robocom is that any program accessing the same area will overwrite the cartridge and a system crash results.

Action Replay

This is a turbo back-up cartridge which also loads normal disk program files at high speed.

What makes this unique is the ability to back-up multibank games and to save high resolution screens for use with graphics programs. In addition there is a rudimentary code inspector.

The inspector lacks a disassembler or any method of modifying memory contents, restricting its usefulness considerably.

The Final Cartridge

This is a very useful cartridge with plenty of facilities. Apart from a range of very useful toolkit commands, there are turbo-exits, disk commands, high resolution screen dumps and a monitor. Back-ups can be made and the cartridge also has a spicic killer which will help you to walk through a few commercial games without being stopped by any studies which appear.

Beyond Cartridges

Of the range I have sampled my personal favourites were the Final Cartridge and the Fever Cartridge but it depends on what you need. When buying a cartridge I would insist on a demonstration first because they all represent a substantial financial investment and its better to be safe than sorry.

My attention has recently been drawn to a new Evromem Micron product: Dolphin D05. This is not a cartridge but a replacement chip for the Kernel ROM inside the computer and a circuit board for the 1341 disk drive.

This gives the benefit of converting the 1341 into a pseudo parallel drive. This means that the normal method of loading from disk by feeding the byte contents into the computer as a long character load is replaced by allowing eight bytes to enter simultaneously via the user port. The new ROM also converts the 64 into a disk only machine so pressing SHIFT and RUN/STOP results in disk loading rather than tape load. If you want to load a tape this can be done by switching out the new ROM and it then emulates the standard chip that it replaces.

The benefits of this chip have to be seen to be believed. A fast load cartridge gives a load speed which is typically five times faster than normal. Dolphin D05 increases this to 20 times normal!

Taking an example of a 140 block program, normal loading will take about 80 seconds and fast load will reduce this to a mere 16 seconds. With Dolphin the time is four seconds and you get a good quality monitor too!

Unlike many of the cartridges, the Dolphin system will load a wider range of protected commercial disks with no problem. It is not infallible but for the weekend disks you simply flick a switch and use the machine as a standard 64.

Another advantage over cartridge

loaders is that the speed also applies to sequential and relative files. The speed increase is lower but still reaches a stunning 10 times the normal rate. For example, loading something like SuperScript with a cartridge won't make a vast amount of difference but with Dolphin you're up and running in seconds rather than minutes.

You never get something for nothing and the first catch with Dolphin is the price tag of around £78 (worth every penny, I may add). The second problem is substituting the ROM. If you're lucky your 64 may have a ROM in a DHL socket but the majority of 64s I have seen (and I've seen a lot) have the ROM soldered on to the circuit board. For most people, even if they are relatively skilled electronics, it will be difficult to remove the ROM without causing damage. I am so impressed with the performance of the system that I'd tend to advise removing the old ROM paying more attention to leaving the circuit board undamaged than worrying about damaging the ROM. You won't need it again so why worry!

The DHL socket is then soldered in place and the chip inserted. If ever you decide to go back to the old ROM it will cost about £30 for a new one but I guarantee that this is worth the risk.

I am not one to rant and rave about hardware but this is an exceptional product and I wonder how I used to manage before.

Although cartridge fast loaders will not enhance the loading speed further I've found that they all operate quite happily with the extended Dolphin chip switched out and many will continue to work with it switched in.

Cartridges make great Christmas presents and I can think of nothing better, except perhaps a Dolphin D05.

Timeline

Power Source, QuickDisk, Dolphin D05: Evromem Micron, Bridge St. Evromem, Weymouth DT1 4BT. Tel: 0189 41869.

The Expert: Trilogic, 29 Welton Lane, Redford WA6 6QA. Tel: 0174 694769.
Power Cartridge: Magnus Products, Highfield, Spencer Wood, Reading, Berks RG7 1AE.

Robocom 50: Redbot, Unit 4, Alnwick Business Complex, St Johns Road, Alnwick, Northumberland. Tel: 01667 4431.

Final Cartridge: M&P Computers, 8 Hornbeamark, Witham, Essex CM8 2SE. Tel: 0178 511471.

Ultimon: Computer Support.

Software for sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out.

It's three o'clock in the morning. You sit at the computer keyboard just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of \$6.00 for disk and \$4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, Times House, 176 The Markways, Harrel
Hempstead, Herts. HP1 1BR.
TEL: (0442) 45415

please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strip containing the article type, C64 Program etc. So that you can see which programs are available on which format you will also find a couple of symbols after this strip. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

AUGUST 1986

FAST FORMATTER — Speed up the formatting speed of your 1541 disk drive with this handy program (C64).

INTOI EDITOR — Our much acclaimed graphics editor for the C64 now used by many professional programmers.

Includes: Character Editor; Sprite Editor; Sprite Animator; Scrolling background editor.

DISKON 128 — Disk utility program for the C128. Includes commands for editing tracks and sectors of the disk, protecting programs, write protect disk etc.

ORDER CODE

DISK MD4UG86 \$6.00

TAPE TC4UG86 \$4.00

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ICON DRIVER — A small routine that allows you to move a sprite around the screen with a joystick. Useful if you want to develop an icon program (C64).

RECONFIGURE — Develop routines to alter the memory configuration of your C64 with ease.

CROSSWORD — Put your brain to work with this superb crossword program. Includes four crosswords for you to try (C64).

ALL CLEAR — Some interesting ways to clear the screen with this collection of routines (C64).

ADVENTURE GRAPHICS — Add graphics capability to our ADVENTURE AID program published in the May 1986 edition of *Your Commodore* (C64).

ORDER CODE

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CROSSWORD — See September issue.

POPUP MENUS — A superb routine that allows you to add pop-up menus to your C64.

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See The Eighties — now you can give your C64 80 column capability, with this program. You have access to two screens either the 40 column screen or the new 80 column one.

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Well, you can prevent this with our C64 Autosave. This will save your programs to disk or tape every five minutes automatically so you won't have too much work to catch up on.

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Cassettes or disk are available back to March 1987. Please ring the Editorial office 09-457-0940 for details of these.

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Interfacing with the RS232

Many people switch off when they hear the mention of the RS232 interface and related subjects. This article is aimed at clearing up some confusion and doubts.

By Steve Currie

Some (if not most) of you will have heard by now of that favourite of all computer industry subjects, the RS232 communications standard. People have been known to go weak at the knees and hile when it is mentioned. Every day, it causes problems for computer engineers connecting up equipment such as printers and modems. It has even given rise to a lucrative business of building the so-called "break-out boxes" for monitoring and "fixing" RS232 lines.

If it is supposed to be an industry standard, why does it cause so much hassle? Every computer manufacturer has different ideas on how to build a computer; which devices to use, how big the screen should be, etc. It would seem that this train of thought also includes the RS232 standard.

Now, before I go on, let me say that the idea behind RS232 is great. A standard interface for connecting different types of hardware (including computers) together. RS232 is really useful in the field of telecommunications. Modems are usually connected to a computer via an RS232 link. You can connect two computers together and transfer programs between them (a technique often called "pooping").

Unfortunately, things are not so simple. With different manufacturers having different ideas on how to implement the standard (Commodore is no exception) a great deal of confusion can arise when two pieces of hardware are to be connected together. Most of this confusion surrounds the way in

which the control lines of an RS232 should be used. Thankfully, this does not concern us in this article since we will be using only a basic RS232 interface.

Basic RS232

As you may know, RS232 uses the serial method of data transmission. Information is sent bit by bit along a single wire to a receiving machine. Since data may flow in both directions, two wires plus a common return are required to make a basic RS232 communication line. The lines are usually connected to equipment by a 25-way D-type connector. Data leaving a computer exits via pin two and incoming data enters via pin three. The Gv return is connected to pin seven. This gives the "3-line" RS232 interface. There is no control over the flow of the data in either direction unless handled by the software (more on this later). An RS232 interface using more than these three lines is known as an "N-line" interface.

It is best to use a three or four core cable with a shield (we will see why in a moment) rather than separate wires.

For the purposes of this article, this is all we require. "Ah yes" you say,

"that's all very well but my Commodore doesn't have a 25-way d-type connector let alone any RS232 interface". True it doesn't have a 25-way connector but it does have an RS232 interface. You mean you didn't know?

Commodore RS232

Since the time of the Vic 20, Commodore has "programmed" in a limited form of RS232 port. I say programmed because the hardware device normally associated with RS232 communications, the Universal Asynchronous Receiver/Transmitter (UART), is not present in the circuitry of the Vic 20, C64, 64C, C128 and C128D. The omission of the C18 and Plus4 is intended. The C16 cannot handle RS232 communications (we shall see why in a moment). The Plus4 on the other hand is omitted for a different reason. This machine DOES have a UART.

RS232 signals appear at the aux port. This is exactly the reason why the C16 cannot handle RS232; it does not have a aux port (a strange omission by Commodore. Anyone knows why?). All the conversion is handled by the Operating System (Kernal). Thus

3-LINE RS232 INTERFACE	CONNECTIONS (25-way D-connector)	
pin	function	
2	Transmitted data	Send
3	Received data	Sim
7	Common (Gv)	Ground

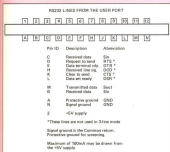


Fig 1

except in the case of the Plus/4) the user port coupled with the Kernel becomes almost the equivalent of the 6851 UART (the 6851 is the device that the software is supposed to emulate).

In the Vic the user port is controlled by a Versatile Interface Adapter (VIA). In the other machines a Complex Interface Adapter (CIA) is used (not a lot of difference as far as this article is concerned). Now before some of you run and hide at the mention of VIAs and CIAs, let me say that (thankfully) we do not have to program these devices directly. The Kernel handles all of the RS232 associated programming.

Figure 1 shows the RS232 associated connections to this port looking from the rear of the machine. Note that the user port uses a 15-pin edge connector (available from Maplin; order number BK74R). The top row of terminals are identified with numbers while the bottom row terminals are identified with letters. This means that it is very easy to connect the socket the wrong way up which could have disastrous consequences for your computer. The correct way is with the letters to the bottom as shown.

Connecting Up

The terminals labelled *txd* (transmitted data) and *rxn* (received data) and *GND* (G=common) are the three lines we need. Note however that there are TWO terminals labelled *rxn*. The reason for this lies with the way in which the RS232 on these machines works. One of the *rxn* lines is for data, the other is a flag or trigger input. Because the Commodore RS232 relies on Non-Maskable Interrupts (NMI) or interrupt requests (IRQ) in the case of the Plus/4, there must be some form of detection to let the system know when data is being received.

When data is being received over the *rxn* line, the voltage level on this pin changes rapidly, causing interrupts to occur. The system software collects the data on the *rxn* line, placing it in an area of memory called the Receive Buffer. There is also a Transmit buffer for outgoing data. Thus the reception and transmission of data is basically transparent to the user. However, this method has its problems as we will see. The practical upshot of all this is that BOTH *rxn* terminals must be connected to the *rxn* line. Since they are next to one another, this is no great problem.

Also note the connection called **PROTECTIVE GROUND**. This terminal should be connected to the shield of your cable if you suspect any outside electrical interference of causing data errors.

While on the subject of making connections, you will have to use a soldering iron. Now don't run and hide (again). If you are not too sure about handling one, get an electronics hobbyist friend to do it for you.

It should go without saying that **YOU SHOULD NEVER MAKE CONNECTIONS TO THE SOCKET WHILE IT IS CONNECTED TO THE COMPUTER**. Always disconnect the socket **BEFORE** making or changing any connections and **NEVER** connect the socket to a live machine. **ALWAYS** switch off the power **BEFORE** plugging or unplugging!

OK. So you've connected your socket up and plugged it in the correct way... what now? If you only want to communicate with an other Commodore (Vic, C64, Plus/4 or C128) then there is no great problem. The only thing to watch is that you must connect the *txd* of one machine to the *rxn* of the other as in Figure 2 in order for them to exchange data (it's obvious really).

Commodore connections

If you don't intend connecting your machine to anything other than another Commodore, you can skip the next bit all together and get on with the programming. If you have a friend with one of the machines mentioned, you will be able to type messages to one another; handy if you live next door and you have a long piece of 3-core cable - your own mini-network! (Not recommended if you live across the street or several houses away!) How far you will be able to keep the machines apart depends very much on the operating conditions. Electrical interference may cause errors and there will come a point where the line is just too long. It's best to experiment with what you've got.

Non-Commodore Connections

This is where things get tricky. Connecting to anything other than a similarly equipped Commodore has its

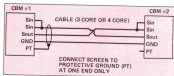


Fig 2

problems. This is because normal RS232C requires logic levels -12s (logic 1) and +12s (logic 0) as opposed to the Commodore RS232C logic levels of 0s (logic 0) and +5s (logic 1). No that isn't a misprint, RS232C logic is opposite voltage level-wise to your Commodore. However this problem can be overcome quite easily. There are various logic devices available specifically for this purpose. Among these are the RS423 line driver 3091 and RS423 line receiver 861X008. These devices convert between TTL logic levels and RS423 logic levels. RS423 is another (wider) standard which is compatible with RS232C (at least to a certain extent). The beauty of using these devices is that they will operate from a +5s/-5v supply. This means that the user port's +5v output (pin 2; see Figure 1), may be used for the +5v supply and all that is required is a -5v supply. These are the devices used by the BBC micro for it's RS423 port. Figure 3 shows the circuit required.

I can hear the groans of discontent. "I can't do that I've never built an electronics circuit before!". If you do have an electronics hobbyist friend, try hitting him/her into building it for you.

I will not go into detail over the construction of the interface. I will assume that if you are building this, you know what you are doing. The 741500 device is used here as a logic inverter. I suggest that you use i.c. sockets so as not to subject the devices to heat which could damage them.

Power Supplies

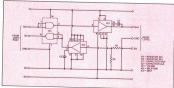
If you plan to use the main (vacuum) power supply circuit shown in Figure 4, I suggest that you use both the +5v and -5v supply circuits so as not to rely

too much on the already overworked computer power supply. It goes without saying that no-one should use the mains unless they do know EXACTLY what they are doing.

The alternative battery supply circuit in Figure 5 assumes that you are using the +5v supply from the computer. This circuit may also be used with one of those pocket calculator mains adaptors (like the Spectrum power supply) since the circuit regulates the voltage to 5s. The diodes shown prevent damage to the circuit if the battery/adaptor is incorrectly connected. Remember to disconnect the battery when you are not using the interface. This has the advantage of not requiring you to build a mains power supply.

Remember that you cannot connect an ordinary Commodore (without this interface) to one using this circuit. Both machines must be similarly equipped. Using this interface, you will be able to connect your Commodore to other computers such as the BBC and any suitably equipped IBM compatible. I have connected my C128 to my Teletron TS1000 (IBM compatible running MS1X08) and

Fig 3



transferred files between them without any problems. This should also work with the Commodore PC10 and PC20 IBM compatibles. The only thing to watch for here is that most IBM compatibles need to have pins for send five (RTS) and CTS1 connected together as shown in Figure 6. The BBC also requires a similar connection. Because of RS232C differences between systems, I cannot say that this will work with every machine, but it will work with most. I have also connected my 128 up to a mainframe DDCSYSTEM 2000 running at 1200 baud with absolute success.

Programming Commodore RS232C

OK, so you've got this far. You've linked your Commodore to another machine. What now?

Using the RS232C interface on a Commodore is much the same as using a printer or a disk drive. You must OPEN a logical file and use PRINT# and GET# to send and receive data. Note that you should NOT use INPUT# since there is a possibility that the system might hang by attempting to get input when it isn't there. Also be aware that on the Vic 20 and C64, the RS232C receive and transmit buffers are created at the top of basic memory when the OPEN command is executed. (The buffers are permanently defined on the C128 and, I think, the Plus/4). This has the effect of wiping out any variables previously defined. (I performed a CLR#). Therefore, you should make the OPEN RS232C statement the first in any program. Another, more serious problem occurs if your basic program is very large. Then there is a chance that OPENing an RS232C channel may destroy the end

[illegible]

The format for the OPEN statement is discussed below:

CPUS	lin,dev,usr,CHRS	Control
	mem,rft+CHRS	Commoned registers

100

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

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name	name@ethz.ch	instid	instid

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of management practices was also found to be important in determining the amount of sediment that is transported out of the watershed.

The ESD322 interface is a device number two. In order to operate correctly, the system requires you to tell it how fast you wish to transfer data (baud rate) and the format of the data (number of stop bits, number of data bits, parity). The control register tells the system the baud rate, stop bits and data bits as in Table 2.

[illegible]

3400 baud is the maximum speed that is available on the Commodore RS232 on the C128. The C64 will allow up to 1200 so this is the maximum baud rate that I will use in the

examples. If however you have any problems, try selecting 600 baud instead.

The command register defines other interface parameters as follows:

	0	1	2	3	4	5	6	7	8	9
P	P	P	P	D	T	T	T	R	H	H
P = Parity				D = duplex				H = handshake		
T = Transmit control								R = receive control		
FFF	D				H (max 151,154)			H (151,154)		
000 Disabled	0 Full			0 3-line				0 Receiver on		
001 Odd	0 Half			1 X-line				1 Receiver off		
011 Even										
101 Mark (1)										
111 Space (0)										
TT (PinA only)								R (PinA only)		
0010Q Disabled; RTS=1; TX off								0 IRQ on		
0110Q Enabled; RTS=0; TX on								1 IRQ off		
1010Q Disabled; RTS=0; TX, On										
1110Q Disabled; RTS=0; RRE										

Table 3

Plus/4 users should refer to pages 207-211 of the user manual for further details on their machine's RS232 interface. This machine can handle transfer rates of up to 19200 baud.

Hardshaker determines how the interface will operate. We will be using N-line. N-line is where you are using control lines as well as the data lines.

These readers, things a bit stronger say we will not be too far from.

Duplex should be set to Full. This determines how the receive and transmit will behave.

Parity is a kind of error check. When data is received, the system checks it to see if it agrees with the parity. If not, the parity error bit in the

variable `ST` (`status`) is set indicating some sort of error. These bits allow you to set the type of parity check required. Of course, both machines should be set to the same parity. In most cases, parity is not used and error checking is done in a different way (more on this later).

This may seem a little complex but it isn't really. Lets suppose that we want to open an RS232 channel to run at 1200 baud, eight data bits, one stop bit, no parity. The OPEN statement would be:

```
OPEN 2,2,0,CHRS24+CHRS25  
(new Plu/4)  
OPEN 2,2,0,CHRS24+CHRS25  
(Plu/4)
```

and that is that! Simple, eh? In fact, if you stick to this particular format of eight data bits and no parity, you can't really go wrong. Just change the hand rate to suit.

Incidentally, the Commodore 64 programmers reference Guide tells you that the command register character is NOT required. It's probably safer to leave it in. My C128 sometimes won't work without it.

Using `PRINTANDGET` we can write a fairly simple terminal program running at 1300 baud. If running this on two machines (assuming its two Commodores) you will be able to type in a message on one keyboard and see it appear on the other machine's display as well as your own. Figure 1 shows the program while Figure 2 shows a similar program for an IBM compatible machine running PCDOS or MSDOS and a 286 or 386.

Figure 7 Continued: Basic and terminal processes

```

10 OPEN "L2:CHR$(24)+CHR$(9)"
20 REM PLEASE USERS USE OPEN
   "L2:CHR$(24)+CHR$(9)"
30 PRINT "CLS"
40 GETW2:AS
50 IF AS="*" THEN PRINT AS:
60 GET BS
70 IF BS="*" THEN PRINT
80 PRINTW2:BS
90 GOTO 30

```

Figure 3. dTmBAC used to identify *Agrobacterium* strains.

```

10 OPEN "COM1:280,N,8,1" AS #1
20 CLS
30 IF LOGIO=0 THEN 50
40 A$=INSTR$(1 TO 99999,PRINT A$)

```

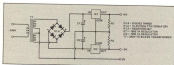


Fig 4

```
50 RS=PEEK%
60 IF RS<>" THEN PRINT
80 PRINT:LINE
90 GOTO 30
```

Both programs check first for a character from the RS232 port. If one is found, it is output to the screen. If not, the program checks for a keyboard input. If found, the character is sent to the screen and also to the RS232.

Another interesting experiment when using an IBM compatible machine is to make the following change to the mini-terminal program on the Commodore:

```
60 IF RS<>" THEN PRINT:LINE
```

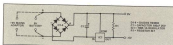


Fig 5

Obviously, not many of you have access to an IBM, but this experiment does show up one very important problem with the Commodore's 4-line RS232 interface. If you take control of the IBM using the CTTY COM1 command again and type DIR which is the MSDOS command to display the directory, the first few lines are printed normally and then suddenly, there is a whole lot of garbage. If you slow down the baud rate to say 560, the problem

and run it. Now type the following on the IBM while in DOS:

```
MODE COM1:280,N,1
CTTY COM1
```

(MODE is external so disk containing the command must be in the default drive).

This causes the IBM to think that its input/output device is the RS232 port instead of the console. This has the very odd effect of making the Commodore control the IBM! (although the character sets are different and some odd graphics characters may be printed). To return control to the IBM console, you must type CTTY CON on the Commodore.

may disappear. Why does this happen? Remember what I said about the Bxocbe buffer? Well what happens is that data is received transparently over the RS232 lines and placed in the buffer. The buffer fills up quicker than Basic can empty it with the result that the buffer overflows and data is lost. Buffer overflow can be detected by examining the ST status variable, but Basic is just too slow and you may still lose data.

Fig 6



Solutions

There are a few ways of solving this problem:

1. Use a slower baud rate to let Basic keep up.
2. Devise some form of software data flow control.
3. Connect control lines up and use an x-line interface.
4. Use machine code to process RS232 data.

Option 1 is not a good idea. Anyone who has used an RS232 link at 300 baud will know why (yawn!).

Option 2 is better but requires programming which we will touch on later when we discuss file transfer.

Option 3 is not really practical here.

Option 4 is probably the best solution in this case. Data can be removed from the buffer much faster using machine code and this will be fine for the speeds at which we will be working (up to 1200 baud).

A very short machine code program can be written to handle the RS232 interface. The routine that follows is given in the form of a Basic loader. Change the variable AD to any free area in your computer's memory (the tape buffer is a good place). This program is for a C128 but it should work on any of the Commodore machines discussed.

```
10 OPEN 1:2,CHR$(24)+CHR$(9)
11 REM PLUS4 USERS: OPEN
12,2,CHR$(24)+CHR$(9)
20 AD=2016:CA=AD
30 READ BY
40 IF BY =-1 THEN POKE
AD,BY:AD=AD+1:GOTO 30
50:
60 PRINT CHR$(14):REM SWITCH
70:LOWERCASE"
80 SYS CA
90:
100 DATA 162,132,198,235,12,128,255,
255
110 DATA 132,204,255,132,248,132,216,
255
120 DATA 132,278,255,248,232,75,
162,132
130 DATA 201,255,204,132,216,195,
132,264
140 DATA 255,26,178,217,-1
```

The only way out of this program is a RUN/STOP/RESTORE. Table 1 is the disassembled code with comments (addresses may differ from your version).

```

0000 LDH #002          : Make channel 2 the current input device
0002 JSR SPFC0         : Scan the RS232 buffer for 1 character
0005 JSR SPFC4         : Save data
0008 TAY               : Clear the channel
0009 JSR SPFC0         : Restore the data
000C TYA               : Restore the data
000D BQJ #0012         : If data is a null (zero byte) then skip
000F JSR SPFD0         : Output valid character
0012 JSR SPFD4         : Check for keyboard input
0015 BQJ #0000         : If more than one RS232
0017 PHA, Save data
0018 LDH #002          : Make channel 2 the current output device
001A JSR SPFC9         : Restore data
001D PLA              : Send byte to RS232
0021 JSR SPFC0         : Clear channel
0024 BSC              : Force loop to check RS232 input
0026 BCS #000000

```

Age Group	Percentage
18-29	45%
30-49	55%
50-69	65%
70+	75%

The program uses the kernel interruptible calls so it should be valid for all of the machines.

After the machine code has been placed in memory, the BSCSI channel is opened with a file number of 2 (the channel number, if you change this

you must change the two LDM instructions in the code) and the machine code routine called. Now the F032 receive buffer does not get a chance to fill up so no data is lost. The OPEN statement could be replaced by the code in Table 4.

```

LEDA #502      : Channel 1
LEDC #502      : Device 2
LEDI #5000     : Secondary Addr. 0
ISR STTBA      : Set logical file
LEDA #501      : 1 char in filename
LEDC # NAME     : Pointer to filename
LEDI # NAME     : Pointer to filename
ISR STTBD      : Set filename
ISR STTCD      : Open BS232
End of code
NAME[0] = 0 : Control and command register values (PLUS
NAME[1] = 0 : Is the byte direction of my C84 and C12

```

Trends

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All this should be fine for Commodore to Commodore communications. It will also work with Commodore IBM/MSX etc. romms but may yield strange results, the reason being that the Commodore do not use standard ASCII codes. They use what is sometimes called PETSCII, the Commodore PET being the first to use it. The most noticeable effect of this is that certain character will appear on the Commodore's screen as graphics characters. The solution to this is to insert some forms of translation table or routine into the code. Since data

flows. For every, a routine or table would be required for each of input and output.

Two translation tables, each of 256 bytes, are required to handle outgoing and incoming data translations. The following program builds the translation tables and the machine code into memory starting at address AD. It needs at least 800 bytes to operate in so you need only change AD to the address you require. This version is for the C128 (Program Translator).

Patient Information:

```
Line 3: AD=start address;  
IR=Control reg CR=command reg;
```

Lines 10-100: Prepare tables
Lines 111-113: Setup name of channel
(register images)
Lines 126-140: POKE receive table
Lines 178-200: POKE transmit table
Lines 203-230: POKE code in memory
Lines 244-278: Adjust table references
in code
Lines 280-290: Adjust register image
references in code
Lines 308-316: Select hardware and
call routine
Lines 158-170: Code data

Table 3 shows the disassembled machine code (addresses are offsets from the start address).

Basically, the operation is the same as before except:

1. The channel is opened from machine code.
2. Characters sent and received are translated.

Note that the backslash (\) character involved will be displayed as a pound sign. The CMM Charset does not have a backslash.

Transferring files via **rsync**

This is probably the most useful application of RS232: transferring data between unlike machines. It is possible to transfer programs between two entirely different machines.

When using a J-line interface, it is necessary to introduce some form of protocol into the software at both ends. This ensures that each machine understands exactly what the other intends to do.

A typical personnel exchange would look like a conversation between the two machines:

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

1000

machines: 1. Encountering data transfer

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

```

machine 0: Sending data (block of
data sent)
machine 1: Received data

```

and so on. The "are you there", "yes," etc. messages are actually 1 byte control codes. Normal ASCII has 32 control codes (codes 0-31). The actual usage varies from system to system and there are one or two protocol standards. For your own use, you don't have to follow any set protocol. ASCII (0-96) AS BOTH METHODS ARE IDENTICAL

THE SAME ONE. Figure 9 gives a list of ASCII code 0-31 and their meanings.

Note the two marked XON and XOFF. These you may recognize. XON/XOFF protocol is useful when large amounts of continuous data are being transferred. The receiving machine sends an XOFF code when it wants the transmitting machine to hold off sending data, and send an XON when it wants to resume. This type of control is often used with dumb terminals to mainframes.

Another method of transferring data is to send it in blocks of 2-255 characters (usually 128 chars). This removes the need for XON/XOFF control because as each block is sent, the two machines exchange control codes. This method of transfer also allows error checking to be carried out on the data. One of the most popular error check methods is the Cyclic Redundancy Check (CRC). We won't go into this here as there is no real need for such a complex check with hard-wired RS232. CRC is really useful for Telecommunications via modems. Phone lines are noisy and data errors may easily result in high baud rates. The CRC error check allows the two machines at either end to check the data for errors; if an error is found, the receiving machine requests that the data is retransmitted again.

When sending data using the block method, the software collects data bytes into "packets" of 128 bytes. Assuming the link is open, the transmitting machine (TM) sends a start-of-transmission code. The receiving machine (RM) replies with an acknowledge code. The TM then sends a start-of-block code followed by a data packet followed by an end-of-block code. The RM replies with an acknowledge code (assuming the data was received correctly) and the TM sends the next block. This continues until all data has been exchanged, whereupon the TM sends an end-of-transmission code and the link returns wait-state.

The above description does not conform to any standard but will work. If error checks are included, the RM could send a data-error code if the data had been corrupted whereupon the TM would re-transmit the same data packet.

0000 LDA #002	: Logical channel 2
0002 LDR #002	: Device 2
0004 LDR #000	
0006 JSR SFFB4	: Set file
0008 LDA #002	: Name length (2 chars)
000A LDR #NAME	: NAME is address of char string
000C LDR #NAME	
000E JSR SFFB0	: Setname
0010 JSR SFFC0	: Open
0012 LDR #002	: Make RS232 the input device
0014 JSR SFFC6	
0016 JSR SFFB4	: Get a character
0018 TAY; Save a	
001A JSR SFFC0	: Restore default device
001C TYA	
001E BEQ 002A	: If char nil then no char seq.
0020 LDA #TABLE.Y	: Get ASCII char from TABLE
0022 JSR SFFD0	: Send to screen
0024 JSR SFFB4	: Check keyboard
0026 BEQ 0035	: No char. loop to check RS232
0028 TAY	: Index
002A LDA #TABLE.Y	: Get ASCII equivalent
002C PHA	: Save
002E LDR #002	: Make RS232 the default output
0030 JSR SFFC6	
0032 PLA	
0034 JSR SFFD2	: Output character
0036 JSR SFFC0	: Restore normal output
0038 SEC	: Forced loop
003A BCS 0015	

Table 5

The program given in Figure 10 should run on any of the CMM machines discussed and is written in Basic. Since the comms are being controlled by the software, the receive buffer will not overflow; it allows a user to transfer a data file from one machine to another. The link is 1200 baud, eight data bits and no parity. It should be run on both machines. The control codes are shown in Table 6.

Note that I'm not using some of these as they should be used but, as I said earlier, as long as you stick to the same protocol on both machines, you'll be OK.

Possible Developments

The example programs I've given here do not show all of what may be achieved using the RS232 interface. It is possible (using a special version of the circuit described earlier) to have more than two machines running on a single 3-line RS232 connector. This would allow a group of users (with special software written in machine code for maximum speed) to set up a mini-network. The possibilities are endless. I hope this article has helped to fuel your imagination. If you have any comments or ideas, please write to me c/o Your Commodore or leave a COMMENT on CompuLink RS232.

Table 6

Code	ASCII	Meaning in this program
3	ENQ	Answer/acknowledge
6	ACK	Acknowledge
1	SOH	Start transfer (transfer file name)
4	EOF	End transfer
2	STX	Start block
3	ETX	End block
26	SOB	Enter terminal mode (suspend seq.)
30	CLE	Exit terminal mode (data link escape)

Figure 1

Code	ASCII	Function	Hex	Hex	Shift in
0	NULL	Null	16	00H	Data link escape
1	SOH	Start Heading	17	01H	Device control 1
2	STX	Start text	18	02H	Device control 2
3	ETX	End text	19	03H	Device control 3
4	EDT	End transmission	20	04H	Device control 4
5	ENQ	Enquire	21	05H	Negative acknowledge
6	ACK	Acknowledge	22	06H	Synchronous idle
7	BEL	Ring terminal bell	23	07H	End transmission block
8	BS	Backspace	24	08H	Cancel
9	HT	Horizontal tab	25	09H	End medium
10	LF	Line feed	26	0AH	Special sequence
11	VT	Vertical tab	27	0BH	Escape
12	FF	Form feed	28	0CH	File separator
13	CR	Carriage return	29	0DH	Group separator
14	SO	Shift out	30	0EH	Record separator
15	SI	Shift in	31	0FH	Unit separator

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

PROGRAM: TRANSLATE	C1	END END	56	END END	ENDS PAGE, FIN, TERM
	58	END DATA 100,0,100,0,100,0,0	58	END EXIT	
		0,100,000,100,0,100,0,0,0,	59	END DATA END	
READY.		00,100,000,00,000	60	END	
	70	END DATA 100,100,0,0,100,00	60	END	
		0,00,000,0,100,00,00,000,	74	END EXIT PROGRAM	
		100,000,0,100,0	75	CLOSED END	
	80	END DATA 0,0,0,0,0,0,000,00	80	END	
		000,000,000,000,0,0,00,			
	81	END DATA 000,000,100	80	END PAGE	
		000,000,000,000,000,000,00	91	END END MESSAGE - END	
		00,00,00,00,00,00			
	100000000	FILEEND	90	END END CTERMINAL PAGE 0	
				ENDPAGE	
	90	FOR J=0 TO 99 STEP 1	97	END END FILE TRANSFER 0	
				ENDPAGE	
	95	FOR J=0 TO 99 STEP 1	98	END	
				END PAGE	
	96	FOR J=0 TO 99 STEP 1	99	END	
				END PAGE	
	97	FOR J=0 TO 99 STEP 1			
	98	FOR J=0 TO 99 STEP 1			
	99	FOR J=0 TO 99 STEP 1			
	100	FOR J=0 TO 99 STEP 1			
	101	FOR J=0 TO 99 STEP 1			
	102	FOR J=0 TO 99 STEP 1			
	103	FOR J=0 TO 99 STEP 1			
	104	FOR J=0 TO 99 STEP 1			
	105	FOR J=0 TO 99 STEP 1			
	106	FOR J=0 TO 99 STEP 1			
	107	FOR J=0 TO 99 STEP 1			
	108	FOR J=0 TO 99 STEP 1			
	109	FOR J=0 TO 99 STEP 1			
	110	FOR J=0 TO 99 STEP 1			
	111	FOR J=0 TO 99 STEP 1			
	112	FOR J=0 TO 99 STEP 1			
	113	FOR J=0 TO 99 STEP 1			
	114	FOR J=0 TO 99 STEP 1			
	115	FOR J=0 TO 99 STEP 1			
	116	FOR J=0 TO 99 STEP 1			
	117	FOR J=0 TO 99 STEP 1			
	118	FOR J=0 TO 99 STEP 1			
	119	FOR J=0 TO 99 STEP 1			
	120	FOR J=0 TO 99 STEP 1			
	121	FOR J=0 TO 99 STEP 1			
	122	FOR J=0 TO 99 STEP 1			
	123	FOR J=0 TO 99 STEP 1			
	124	FOR J=0 TO 99 STEP 1			
	125	FOR J=0 TO 99 STEP 1			
	126	FOR J=0 TO 99 STEP 1			
	127	FOR J=0 TO 99 STEP 1			
	128	FOR J=0 TO 99 STEP 1			
	129	FOR J=0 TO 99 STEP 1			
	130	FOR J=0 TO 99 STEP 1			
	131	FOR J=0 TO 99 STEP 1			
	132	FOR J=0 TO 99 STEP 1			
	133	FOR J=0 TO 99 STEP 1			
	134	FOR J=0 TO 99 STEP 1			
	135	FOR J=0 TO 99 STEP 1			
	136	FOR J=0 TO 99 STEP 1			
	137	FOR			

```

170 GOTO RETURN      ;SEEK BACK TO F
180 LOOP
190 FOR :
200 FOR :
210 FOR :
220 FOR :
230 FOR :
240 FOR :
250 FOR :
260 FOR :
270 FOR :
280 FOR :
290 FOR :
300 FOR :
310 FOR :
320 FOR :
330 FOR :
340 FOR :
350 FOR :
360 FOR :
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890 FOR :
900 FOR :
910 FOR :
920 FOR :
930 FOR :
940 FOR :
950 FOR :
960 FOR :
970 FOR :
980 FOR :
990 FOR :

```


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C16/Plus 4 Reference Book

A new book from ANCO may be just the thing that all C16 and Plus/4 owners have been waiting for.

By Stuart Cooke

Despite the fact that Commodore does not seem to be supporting the C16 and Plus/4 computers at all, the machines seem to be doing surprisingly well. The fact that it was possible to buy a Plus/4 for around £80 may have something to do with this.

Numerous software houses have now started producing good quality software for these machines and are doing very well for themselves. However, the problem occurs when a C16 or Plus/4 owner wants to start writing their own programs. Basic provides no problems, all the information that you require can be found in the manuals accompanying the computer.

Should you want to enter the world of machine code, and the world of professional computing then I'm afraid that it is a different story, there isn't much information about.

Anco is hoping to change all of this with a new book *C16/Plus 4 Reference Book*. To quote the manual "The book contains all the essential information that you need to know when using your Plus/4 and C16. All the important aspects are explained in detail, the items already covered in the manual received with the computer have been omitted. The graphics and machine language are specially stressed and demonstrated with example programs".

So does the book live up to its introduction?

The book comprises of five chapters each dealing with a specific

subject. The first of these is graphics. The manual deals with the basics of graphics so with this little tome it's straight in with how to POKE graphics characters on to the screen, complete with screen memory map of course, an example of how to POKE characters is given and the whole section is easily understood by anyone who has a rudimentary knowledge of the computer. Following this the chapter goes on to discuss the possibility of user-defined character sets, again with a clearly-documented program that re-defines a character - it changes the sign to a degree symbol.

This chapter, though clear, shows that the book was probably rushed out on to the streets as there are quite a number of mistakes that should have been caught. For example, if you can make sense of the following sentence, which is, by the way, the first sentence in the section dealing with re-defined characters, you're a better person than I am: "As you have already learnt in chapter 2.1 the extent and total memory space consumption/graphics possibility of the C-16 is the use of the existing characters."

But never mind, the rest of the section makes things clear and it is well worth reading.

Once low resolution graphics are out of the way, it's on into the world of high-res graphics, multi colour graphics and extended-colour graphics. Again the explanations are clear and concise and illustrated well



with a program. A machine code program to allow you to draw on the

screen with a joystick is given and this is used to illustrate some of the points.

Soft-scrolling of the screen (moving it up one pixel at a time) is dealt with briefly, though again in enough detail to give most programmers the information that they require and then it's on to the raster-interrupt. For those of you not sure what this is then I suggest that you go and buy the book, for those of you that do then you will be interested to learn that scrolling the screen is dealt with in detail complete with a program that allows you to scroll text on the screen with a joystick. All programs are given in both hex-dump format and assembly code when necessary, this means that you can read the assembly code to find out what the program is doing.

Music is the heading of the next chapter, getting your C16 and Plus/4 to play both in Basic and Machine code is covered. Firstly we have a Basic program that shows you just what is possible from Basic. Following this is a program illustrating how to make your computer play music or interrupts. This is one instance in the book that I felt that the author could have produced a better explanation of the program and how to use something

similar in your own programs.

The Book then enters the world of machine code programming. The first section, entitled *Introduction to Machine Code*, tries to teach machine code in only 13 pages.

I realize that this isn't possible and that whole books have been written on the subject of machine code. However, this section is excellent, it probably won't make anyone a machine code genius but it will stop people from bawling at the sound of the term and will show them, again through examples, how to print something to the screen, how loops work etc.

A full description of the 7801 processor commands is given with the commands in alphabetical order with descriptions, their form of addressing, the assembler format, the number of bytes it occupies and how many machine cycles it takes to function.

A description on how to use the computers in-built kernel routines is given, together with a list of them all. Now you have no excuse for not knowing how to LOAD and SAVE programs in machine code, or how to get a character from the keyboard in a machine code program. All this and much more is dealt with again in an

extremely clear way with the name of the routine being given, its address in the Kernel what registers are used etc. all being given.

An excellent memory map of the computers is given, extremely important if you wish to use machine code. The map could have done with some examples of how to use the various addresses to your own benefit as I am afraid that beginners to machine code will find the location of many of the addresses totally baffling. The more experienced programmer will be able to find all of the information that he requires though and this section will undoubtedly become one of the most thumbed in the book. Maps of the TED chip and KERNAL jump table are also given which again will come in extremely useful.

If you have ever used a C16 then you will find the comparison of the memory maps of the C16 and C12 extremely useful. I know I did when I needed to find out where the border colour was stored on a C16. Its 2320H on the C16 but where on earth is it on a C12? This comparison will show you.

The final section of the book provides the reader with some machine code utilities ranging from a joystick scan routine to an GILD (generating a NIBBled program) routine. Accompanying this article is a sample section from this chapter of the book, I hope that this gives you a good idea of what is possible with this book.

Verdict

I must admit I have been waiting for a book like this on the C16 and Plus/4 ever since the machines were first launched. OK so the book isn't perfect and there is room for a lot of improvement. However, the book does provide the advanced programmer with all of the reference material that he should ever require.

If you are into serious programming then I would suggest this is one book that you must go out and buy, it will become an invaluable, if not the most important book in your collection.

Finalline

Name: *C16/Plus 4 Reference Book*
Price: £7.95 Publisher: *Amco Software*
Amco Software, 4 West Gate House,
Spital Street, Barchford, Rens, D44
3EE. Tel 0537 92315-92316 FAX: 0-
777-09311-5

640 TURBO MODE FOR THE C 16

For all those who think the C 16 is too slow, we also show you a trick with which it will become about 30% faster. Since we live in a turbo age, we simply call it the Turbo Mode. The trick is to switch the screen off, of course this is impractical if you want to create Graphics and use them at the same time, but not if you have no essential problems to solve, where you don't always have to look at the screen. The speed advantage arises from the fact that the Video-Chip TED doesn't slow down the Main Processor anymore once the screen is switched off. A small test program, first in turbo mode and then in the normal mode, will show you how it works and how much time you can save.

```
100 PEEK 45286,PEEK(45286) AND 255
110 GOSUB 150
120 PEEK 45286,PEEK(45286) OR 255
130 GOSUB 150
140 END
150 T=TI
160 FOR I=1 TO 1000
170 I=I+1
180 NEXT I
190 PRINT USING "###.##";(TI-T)/1000
200 RETURN
```




Animator

Graphics can play a key part in C64 programming especially if you have the right. Our Animator should bring you one step closer to perfection.

By Allen Webb

Thanks to the speed available through computers, it is possible to achieve a wide range of graphical effects. As you will appreciate, the first system developed for animation involved the creation of a number of similar pictures which, when displayed in sequence, give an impression of movement.

Animator allows you to design, store and subsequently play back a sequence of 80 pictures. Depending on the delay used, the sequence can take from about two seconds to about 24 seconds.

So that you don't have to mess about with various utilities, the Animator program is self contained and provides options for:

- 1) Picture creation,
- 2) Play back of the sequence,
- 3) Saving and loading of files from tape or disk,
- 4) A character designer.

In order to keep the amount of typing to a minimum, I have taken two actions. Firstly, the package is in two parts, the editor/animation/data handling module and the character designs. These modules are almost completely independent except that:

- 1) If you load and run the editor/animator module alone, you must not use the design character option.
- 2) The character designer cannot save or load character files itself - it relies on the facilities in the editor/animator module.

Secondly, I have left out a option

option. I originally intended to allow you to overlay animated sprites on top of the animated backgrounds. I hope, in the near future, to write a third module offering this option which will use files created by these two modules.

Before I launch forth, let's consider what you might do with this package. When writing it, I had the younger set in mind. Most children like cartoons and the ability to easily create and manipulate animated sequences is equally appealing. Having said that, the system is also of use to the more serious user. It's very handy to be able to quickly create and mess about with sequences for use in games. As such, it provides an ideal test bench.

The modules are given in the two listings. Once you've typed them in, SAVE them. To create a stand-alone program, follow these steps:

- 1) Starting with a reset machine, type in the line:

10 SYS 2380

- 2) Input the instructions:

POKE 44,0: POKE 12389,0: NEW

in direct mode.

- 3) LOAD and RUN the main module loader.

- 4) LOAD and RUN the character designer loader.

- 5) Input the instruction:

POKE 44,0: POKE 45,200: POKE 48,34

in direct mode.

- 6) SAVE the program.

To ease the use of the program, a series of menus is used with prompts to the keys available as required. The RUN/STOP key is used throughout to return to the previous menu or to leave the program.

On running, you will see the main menu. This gives the options:

- F1: Edit mode
- F2: Animation mode
- F3: Data manipulation
- F7: Design characters

Pressing the relevant function key gives you the next menu.

Edit Mode

The edit menu gives the following options:

- F1: Insert frame (this will only work properly if you are using a set of inverse field characters corresponding to the normal set in use)
- F2: Save frame to RAM.
- F3: Scroll mode. This gives a sub menu allowing character scrolling in four directions. The keys U,D,L and R perform these tasks.
- F4: Recall frame from RAM.
- F5: Graphics mode. This gives a sub menu with the options:
 - H: Switch to high resolution graphics.
 - M: Switch to multicolour mode.
 - E: Switch to extended mode.
 - C: Change background colour.

2.3.4: Change colour registers.

F6: Jump to next frame.

F7: Toggle key repeat.

F8: Set main frame to current cursor colour.

Again from these keys, there are controls for drawing the picture: Cursor keys, HOME and CLR act as usual but only within the frame. Control keys change cursor colours as usual. Reverse field can be toggled as usual. Press any key to place the relevant character on the current cursor position in the current cursor colour.

When you save a frame to RAM, both the characters and the colour of any frame are saved.

Animate Mode

This mode allows you to replay a specified sequence of frames. The menu shows the options:

F1: Set start frame

F3: Set finish frame

F5: Set delay between frames (1=fastest, 25=slowest)

F7: Run animation sequence

Data Mode

This allows the manipulation of data files.

The frames are saved in RAM as sequential blocks of data:

Character	Colour	Character	Colour... etc
Frame 1	frame 1	frame 2	frame 2

F1 allows you to save a block of frames to disk or tape. Because the full 50 frames occupy a lot of storage space, you can specify how many frames you save by setting the last frame in use.

F3 saves the block 0000 to 83FF. This is used by the character designer to hold your modified characters.

F5 loads either pictures or characters to the current address.

Character Designer

This module can be used independently but you will need a machine code monitor or similar to SAVE or LOAD the characters. If you use it in this way, you enter the program by SYS 6704.

The designer screen has a number of features:

1) Along the top, the character set is displayed. The current character flashes.

2) The bottom few lines show the key options.

3) In the middle is the edit window. This shows the shape of the current character.

4) To the right of the edit window are shown the colours currently in the colour registers. These are shown as numbers beside a representation of the relevant bit pairs.

5) Below the colours is a second window. On start-up, this is a single character. This can be expanded to give a six by six array of characters. This allows the design of large designs.

The operative keys are:

CTRL-N: This switches on redefined characters and down loads the character set. You must use this command before you can start work on new characters.

→ Move to the next character

← Move to the previous character

M: switch to multi-colour mode

H: switch to high-resolution mode

C: copy the character specified by the next key pressed

A: move to the character specified by the next key pressed

R: reverse the current character

→ flip the current character, left to right

S: rotate the current character

CTRL-R: switch on key repeat

CTRL-O: switch of key repeat

F1: scroll current character horizontally

FR: scroll current character vertically

R: expand window horizontally

V: expand window vertically

CTRL-E: reduce window horizontally

: reduce window vertically

W: Update window to start at current character

% set a point in the character and move the cursor horizontally to next point

Z: set a point in the character and move the cursor vertically to next point

SPACE: clear a point in the character and move the cursor horizontally to next point

CTRL-Z: clear a point in the character and move the cursor vertically point

The cursor keys, HOME and

CLEAR act as normal except that they act on the edit window

2.3.3: change colour registers (Framer)

I know that the range of key presses is large but I'm sure that you'll find the program easy to use.

To help you through the system, here is a sample work session.

On running the program, you see the main menu. Press F7 to enter the character editor. Press CTRL-N to activate the definable character set. You should see the rubbish in the edit area change to a giant "R" character. ORZ try some of the keys to change the shape of the design. You will see that each action is mirrored in the normal flashing "R" at the top of the screen. Move on to the next character ("A") by pressing + and redesign that. Once you've got a few redefined characters, press RUN/STOP once to return to the main menu.

Press F1 to enter edit mode. You should see a cursor flashing in a rectangular area of screen. The prompt line should show you that you are set up for screen 1. Press F4. The edit area should be filled with garbage. You've just recalled screen 1 from RAM. Press shift-CLR followed by F1. This clears the edit area and sets it's colour to white (the current colour). Press a few keys. You should get the character corresponding to the keys pressed. Press F3 to enter scroll mode. You will see a prompt line showing which keys operate. Press a few and see what happens. Press RUN/STOP to return to the edit mode. Press F5 and have a quick dabble with the colours and graphics modes. When you've designed screen 1, press F2 to save it to RAM. Always save the screen before leaving edit mode or you'll lose the design. Clear the screen and press F4. You should see your design again. Move onto the next frame by pressing F6. The edit screen content are retained so that you don't have to redraw it. Try drawing and saving a few screens. Press RUN/STOP to return to the main menu.

Press F3 to enter animate mode. Set the start frame to your first frame (F1) and the finish frame (F3) to your last frame. Try playing the sequence at different delay speeds. Press RUN/STOP to exit to the main menu.

Press F5 to enter the data storage mode. Try saving and reloading your character set and animation sequences. To exit from the program, press RUN/STOP when at the main menu. ☺



51 800 800145,151,173,134,3,14
2,140,32,308,14,31,112,14,23
2,210,10,380

52 870 800146,18,36,31,179,14
180,3,140,31,208,31,139,135
5,200,210,290

53 800 800147,14,140,31,12,13,
21,14,11,11,140,31,14,121,3
1,204,14,14

54 800 800148,190,0,31,49,13,70
31,151,100,14,308,0,32,14,3
0,114

55 800 800149,31,15,191,85,108
0,31,14,14,14,131,15,191,3
308,114

56 800 800150,140,0,141,31,308
0,151,31,11,170,15,12,121,
1,14,14

57 800 800151,17,70,3,10,31,33
0,14,193,3,140,31,208,32,308
175,170

58 800 800152,151,200,73,240,0
1,200,73,240,70,201,14,308,0
0,200,49,300

59 840 800153,75,191,30,210,80
1,191,31,190,191,201,12,200,3
14,201,3,30,80

60 800 800154,210,140,0,140,70
190,1,191,140,15,170,15,14,
210,17,190,70

61 800 800155,174,17,11,3,19,14
0,8,141,31,190,140,17,141,17
1,14,14

62 800 800156,309,13,140,17,141
17,208,140,14,14,32,308,70,
140,17,140

63 800 800157,14,141,31,190,70
0,17,141,31,190,70,300,13,21
0,17,190,300

64 800 800158,15,140,0,14,141
17,190,32,140,14,19,190,13,
14,14,17,190

65 800 800159,171,14,190,14,1
0,141,14,190,14,19,14,14,14
0,17,190,190

66 800 800160,200,17,15,190,0
1,14,141,31,200,17,190,14,19
1,19,17,190

67 8000 800161,14,190,17,70,3
0,21,15,141,14,190,31,30,2
0,24,30,190

68 1000 800162,140,31,190,3,14,
0,140,191,140,190,160,14,32
0,17,190

69 1000 800163,18,190,3,31,32,70,
31,31,15,14,30,31,31,12,12,3
0,140

70 800 800164,30,31,31,32,30,3
0,32,31,31,12,12,30,31,31,32,
310

71 1000 800165,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

72 800 800166,140,191,140,14,
0,140,191,140,191,140,14,32
0,31,31,14,14

73 1000 800167,30,31,31,32,30,3
0,32,31,31,12,12,30,31,31,32,
310

74 1000 800168,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

75 1000 800169,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

76 1000 800170,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

77 1000 800171,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

78 1000 800172,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

79 1000 800173,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

80 1000 800174,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

81 1000 800175,140,191,140,14,
1,140,191,140,191,140,14,32
0,31,31,14,14

82 1150 800176,124,132,3,180,0,2
0,14,140,125,180,124,180,14,
12,14,120

83 1100 800177,120,120,3,170,3
1,1,120,12,180,120,120,12,12
0,14,140

84 1170 800178,180,180,180,141,
180,13,30,31,170,90,30,141,3
70,170,141,200

85 1100 800179,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

86 1000 800180,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

87 1000 800181,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

88 1000 800182,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

89 1000 800183,120,120,120,120
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90 1000 800184,120,120,120,120
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91 1000 800185,120,120,120,120
120,120,120,120,120,120,120,
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92 1000 800186,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

93 1000 800187,120,120,120,120
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94 1000 800188,120,120,120,120
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95 1000 800189,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

96 1000 800190,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

97 1000 800191,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

98 1000 800192,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

99 1000 800193,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

100 1000 800194,120,120,120,120
120,120,120,120,120,120,120,
120,120,120,120

101 1400 800195,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

102 1400 800196,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

103 1400 800197,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

104 1400 800198,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

105 1400 800199,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

106 1400 800200,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

107 1400 800201,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

108 1400 800202,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

109 1400 800203,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

110 1400 800204,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

111 1400 800205,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

112 1400 800206,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

113 1400 800207,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

114 1400 800208,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

115 1400 800209,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

116 1400 800210,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

117 1400 800211,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

118 1400 800212,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

119 1400 800213,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

120 1400 800214,140,140,210,210,
32,140,14,210,14,140,210,14,
140,14,210,14

Plus/4 Dumper

Now you can transfer what's on your screen to paper via your printer and obtain a hard copy of everything you do.

By Mick Healey

Many larger industrial computers offer a screen-dump facility. This means that whatever is printed on the screen can be reproduced exactly on paper. Permanent copies may be obtained of just about anything you like including: Pie charts, histograms, circuit diagrams, mechanical diagrams, partial stock lists, program modifications etc.

There are programs around for text dumps, but most seem to be written in Basic and need to ask the user questions (like upper or lower case text) before they will do a printout.

Enter then, the all singing, all dancing, intelligent screen dump program. This program will check automatically whether upper or lower case text is being displayed and print accordingly. Reversed characters are also recognized and dealt with by this program (automatically). There is, of course, one BUT...but it cannot print the double quotes symbol. This is due to an inherent function of the MPS-801 printer. When the printer prints an odd number of double quotes, it starts to print ASCII values for the printer control codes used by this program. The result is a totally disorganized mess, which does not look much like the original. For this reason the double quotes symbol will be replaced by a single quote every time it appears. This is unfortunate but is the same method used by the word processor package in the Plus/4 itself.

While I am on the bad points, I should also mention that custom characters cannot be dumped from the text screen, though they can from the graphics screen. Also, when obtaining a graphics dump the last three rows of

pixels on the screen will not be dumped, though this is usually unimportant.

Great care has been taken to make this program 'invisible' to Basic and its variables. Once loaded the program can be considered as one of the computer's functions. It lives and works between locations 34080 and 3463E. Some of the routines used need to change values stored in page zero. This would then upset important sectors stored in page zero and cause the computer to crash. For this reason the program will store page zero (in its entirety) in a safe place, before any damage is done. Page zero is then returned at the end of the program. The

end result of this is that the computer has been made to produce a printout, and will continue to do what it was doing before, as if nothing had happened (i.e. this program is invisible).

The function keys have also been re-assigned. This allows the text/graphics dump to be used in direct mode as well as program mode. Pressing function key F1 will cause a text dump to be produced. Function key F4 gives a graphics dump. To include these routines in a basic program then call the following:

SYS 16384 for a text dump.
SYS 16648 for a graphics dump.

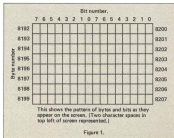


Figure 1.

Memory Allocation

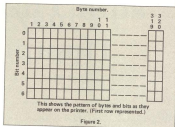
The following addresses are all in hexadecimal; the descriptions explain what happens in that area of memory.

#55F - #58F - function keys (unused).
#600 - #604 - test dump program.
#605 - #2B5 - graphic dump program.
#2B6 - #2B9 - show page zero in safe area routine.
#2BA - #2BD - return safe area to page zero routine.
#2BE - #42D - graphic screen address table.
#42E - #434 - unprocessed graphic character.
#435 - #43C - processed graphic character.
#43D - #47E - output buffer (graphics & text).
#47F - #47E - safe area for temp store of page zero.

Test Dump

The test dump is basically a code converter. Firstly, all of page zero is stored in a safe area at #407F by the routine at #4284. This will protect all registers set up by a Basic program. The contents of location #FF13 are then checked twice if the screen is displaying upper or lower case text. A channel is then opened to the printer. The appropriate font will be selected according to the contents of #FF13 (ref. pages 40-41 of the MPS-801 Users Manual). Locations #22 and #23 are loaded with the start address of the test screen (#0C08). The X-register (row counter) and the Y-register (column counter on screen) are both set to zero. Location #44 is a counter which keeps track of how many characters are to be sent to the printer to produce a row of print. The value stored in #44 will vary depending on how many reversed characters are to be sent. Every time a reversed character is to be printed, three characters have to be sent: RVS ON, the character, RVS OFF. Location #49 is set to zero for each row being processed, as is the Y-register.

A problem exists with the test dump, which is the reason for the length of the test dump program. The characters stored in test screen memory are stored as screen display code. Characters to be sent to the printer must be sent as ASCII code (ref. pages 182-186 of the Plus/4 User



Manual). As can be seen from the two tables in the User Manual, each character has two different values. Consequently the characters have been grouped into sets of 32. It is the order of the sets that is different. The program takes a character from the test screen memory, and finds out which set of 32 it is in (screen display code).

From this point it is merely a case of adding a pre-defined number to do the conversion. The method used to find which set a character is in, is purely a case of subtraction. The character value is taken, #320 subtracted and accumulator is checked, to see if it contains a positive number. If it does contain a positive number then the character must belong to a higher group of 32 characters. In this case the #320 is added back to the number and the analysis is continued in the same way by subtracting #360, #400 and #440 in that order. Each time, if the answer is positive, the number subtracted is replaced. When the result in the accumulator is not positive then the program has located which block of 32 the character belongs to. The program will then add #360, #440, #520 depending whether the character is in the first, second, third or fourth set of 32 characters respectively.

Example

Assume the character to be processed is the spade symbol. As can be seen in the SDC table it has a screen display

code of 63 (decimal) which is #40 in hex. To convert to ASCII the program follows this method.

```
#541 screen display code for spade symbol
#521 subtract #320
ANSWER IS POSITIVE SO NOT IN THIS GROUP OF 32.
#541 replace #520
#531 subtract #360
ANSWER IS POSITIVE SO NOT IN THIS GROUP OF 32.
#541 replace #540
#521 subtract #400
NOTE: THE NUMBER HAS WRAPPED AROUND THE NEGATIVE FLAG IN THE PROCESSOR HAS BEEN SET. THIS IS THE CORRECT GROUP OF 32 CHARACTERS.
#531 add pre-defined number #580.
THIS IS THE ANSWER (#400) IS 97 IN DECIMAL. CHR$97) IS THE SPADE SYMBOL.
```

However, just before the above process is executed, the screen display code currently being processed is ANDed with #555. If the result is less than, or equal to, #57F then the above process is executed in the normal way. If however the result is greater than #555 then the program realises it is dealing with a reversed character, so it moves #44 to the next free location in the output buffer (#44D) plus the contents of #44D. This sets the pointer up for RVS ON. The value in #44 is incremented by #501. The character is then converted in the normal way and

stored in the next free location in the output buffer. If the program is dealing with a reversed character then it will store #99; in the next free location (99% OFF) and again increment 99 to 100.

When each character has been fully processed and stored in the output buffer (including RVS-ON and RVS-OFF codes) the V-register is incremented by #001. When the V-register reaches #025 one row of text has been processed and is stored in the output buffer. The routine at #005P then sends the processed data to the printer, followed by a carriage return. The X-register is incremented by #001 and compared with #010. If it is less than #010 then the next screen row location (stored in #022-#023) is incremented by #008 and the whole process repeated for the next row.

When all rows have been printed the printer is set to the default font and the channel to the printer is closed. Page zero is restored by the routine at \$0200 and the program returns to Basic, or it continues from the next line.

The program works because each high resolution image on the screen is actually made up of 64,000 dots (each individually selectable) arranged in a definite (though rather complex) pattern. In much the same way the printer produces its images using a pattern of dots, although the way the dots are arranged is very different.

In essence then, this program must translate the pattern of dots on the screen, to a pattern recognizable by the printer, while preserving the image to be printed.

Because there are 64,000 dots some or all of which have to be translated and sent to the printer, it can be seen that a great deal of processing has to be done. The programmer/user will want their printout as quickly as possible (in business this would be essential - time is money), so the whole routine has been written in machine code. This saves a considerable time saving cost.

the equivalent Basic program which took 25 minutes to produce a single high-res screen dump. In machine code this program is reduced to three minutes. This is still fairly slow—but is the maximum speed achievable using the MIPS-88 printer. The reason for this is the size of the printer's input buffer—80 bytes. A single row of the high-res screen was 320 bytes. In order for the printer to produce a single row of the high-res screen its buffer must be filled and emptied continuously. The

involves reading 80 bytes of translated data from the computer - telling the computer not to send any more data - pointing the 80 bytes now in the input buffer - request the next 80 bytes and so on. In other words the printer head must make four passes for each row of bytes on screen.

Hacking electronic enthusiasts may find a way to make the input buffer larger and to reduce the printing time, the rest of us will have to wait two or three years.

WINTER-CHATEL

[illegible]

MONITOR: FUNKEY

[illegible]

11

numbers the program adds 880 (118). The final eight results are then stored in the 120 byte buffer located at 844 (80 + 17400).

The program is stored in RAM starting at location 84185 (8443 decimal) and is protected from Base and its variables. When the program is loaded in to memory an address table starting at location 8420E (17654 decimal) is also loaded. This address table contains the start address of each row on the screen. The program takes most of these start addresses to produce the first row of print on the printer. It should be noted that a single row on the screen is eight dots deep, the printer can only print seven dots deep and this is the main reason for the address table. The eighth address is carried forward and used as the first address in the second row.

The program uses these addresses to look at the screen and decide which dots are "ON" and which are "OFF". This process is too complicated to explain in much detail without writing a book so an assembler listing has been included for the inquisitive machine code connoisseur.

The main working parts of this program are the address table, a set of eight 'dummy bytes' which move the results as they are obtained, the 'result buffer' which moves the 32n bytes to be sent to the printer. The data on the screen are printed from left to right within each byte on the screen, while they are arranged from top to bottom on the printer (see Figs 1 and 2). Each byte on the screen represents eight dots across the screen, but on the printer only seven dots down the paper. The program looks at bit 0 of each byte in turn on the screen (at which only seven chosen from the address table are being processed) to see if it is 'ON' or 'OFF'. If the bit is 'OFF' then the program looks at the same bit in the next byte. If the bit is 'ON' then a number to the power of two is added to the appropriate 'dummy byte' (NOTE: these dummy bytes are always preset to 0 before processing a set of seven bytes). The number which is added to the power of two is derived from whichever of the seven bytes is being worked upon i.e. if in the first of the seven bytes then add 200 to the appropriate dummy byte, if in the second then add 211, the third add 212 and so on.

The result of all this processing is right, sensible numbers all less than or equal to 47 (107). To each of these

numbers the program adds 880 (118). The final eight results are then stored in the 120 byte buffer located at 844 (80 + 17400).

The program then adds 508 to each of the seven addresses it took from the address table and repeats this and the above process 40 times. It has then translated the first row on the screen

At this point the 320 bytes of data that have been processed are now ready to send to the printer, which it does. When the printer has done its bit (remember four pages of the print head), the program takes the next seven addresses from the address table and repeats the above process 28 times, so printing all rows and hence the entire screen (well, all except the bottom three dots of the last row—which did not justify the extra programming required).

The program must now return to Basic from the same point it left. This has been achieved by saving A11, of page zero in a safe area of memory starting at 4451F (37983) before any translation was done, so the bootstrap

of the program). Page zero is then returned to its rightful place after address processing is complete (i.e. at the end of the program). When the RTS instructions at the end of the program is encountered, the program will send the processor to the point it started before a interrupt was requested.

The instructions below aren't quite complicated at first, but are really very simple. The whole program does not have to be entered at one sitting provided what you have done so far is saved. If at any time you decide to save what you have typed, simply execute the next **SAVE** routine in the instructions, and make a note of the address you have reached. At the next sitting you can reload the program using the same specification in the same routine. You may then carry on as if nothing had happened starting at the address noted previously. The only thing to watch is to change the filename of that section when you need to save it again.

Lowest research priority

NOTE: Do not deviate from this sequence, it can very soon become confusing otherwise.

- Q) Refer to the listing "FUNKEY".
- Z) Type MONITOR (return).
- 3) Type M O S M (return).
- 4) Change the values that appear on the screen, by typing over them to the values in the listing "FUNKEY". Do not attempt to alter the reversed characters on the right of each row.
- 5) Type: SFUNKEY>A,05FF,05FF where n=1 for tape or n=0 for disk. NOTE: The first program has been saved on tape or disk.
- 6) Refer to the listing "GRATEX".
- 7) Type: A 400 JSR \$4254 (return).
- 8) The screen will now prompt you with \$4003. Type: LDA \$FF15 (return).
- 9) Continue in this fashion until the end of the "GRATEX" listing.
- 10) Type: SCRATEX>A,4000,425E where n=1 for tape or n=0 for disk.

[illegible]

10) Refer to the listing "TABLE".

12) Type: M 429E (return)

13) Change the values on the screen to those in the listing "TABLE" by overtyping. When the first essential has been changed then type: M (return) to obtain the next screenful. Continue in this fashion until the end of the listing "TABLE".

14) Type: \$TABLE,a,429E,442E where n=1 for tape or n=8 for disk.

15) Type: L:GRATEX,a (return)n=1 for tape or n=8 for disk.

16) Type: L:TABLE,a (return) n=1 for tape or n=8 for disk.

17) Type: \$SUPERDUMP,a,480E,442E (return).

NOTE: Make another backup copy on another tape or disk.

18) Type: X (return) you are now back in Basic.

19) Enter the following Basic program.

```
10 GRAPHICS:GRAPHICS:POKE
44,71:POKE 646,71:POKE 650,71
30 NEW
```

20) Type: D\$AVE:NEW (return).

NOTE: If using a disk drive then the programs "GRATEX" and "TABLE" may be erased from the disk since they are now combined under the heading "SUPERDUMP".

To do this enter the following Basic commands:

```
SCRATCH "GRATEX",DPO (return)
SCRATCH "TABLE",DPO (return)
```

If all has worked out well, you should now have three programs: "FUNKY", "SUPERDUMP" and "NEW".

This program is very simple to use once loaded. To load the program into memory follow these instructions:

1) Switch the Plus/4 "OFF" then "ON" again. (The best test known).

2) Type: DLOAD:NEW (return) (LOAD for tape) then RUN (return).

3) Type: MONITOR (return).

4) Type: L:FUNKY,a (return) n=1 for tape or n=8 for disk.

5) Type: L:SUPERDUMP,a (return).

6) Type: X (return).

The computer is now in Basic and the Superdum program is in memory.

The superdum may be used in direct mode or program mode.

Direct Mode

Stop your program when the screen you want to print is being displayed. Press F1 for a test dump. Press F4 for a graphic dump. That's it the Plus/4 does the rest!

Program Mode

When writing a program you may decide that a screen dump option would be useful. This is very simple to achieve. Simply include the appropriate instruction (below) for your requirement.

TEXT DUMP type: SYS16384
GRAPHIC DUMP type: SYS16645

Again, the computer will do the rest.

I am sure that this program will be of very great interest to many people. This program took me six months to perfect (spare evenings) and to use at least, was worth every minute. ☺

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Fault Finding

Entering a program into your computer only to find that it doesn't work is extremely frustrating. Here are a few tips on some of the most common problems.

By Stuart Cooke

Whether you are entering a program from a book or magazine or you are trying to create your own masterpiece those little bugs always manage to slip their way into your code somewhere.

So what do you do? Well, the first and most obvious method of debugging a program is to sit down and read it through. Even this isn't infallible, and so I speak from experience, you check it, your neighbour checks it, Freddie the family parrot even gets in on the job. But still the error hides in their somewhere.

Having dealt with people's programming queries for a number of years I have noticed a several specific programming errors keep rearing their heads again and again. I hope this article will provide some tips that will help you to debug your programs more easily.

Know it AID

Some people think that the computer is a device that is totally infallible, this isn't the case. Probably the most common problem is the fact that the computer gives you an error in a certain line number. You go to the line, check it, check it again and even get someone else to check it. Don't be fooled, just because the computer says that the error is in line N, DON'T BELIEVE IT. Your problem may be elsewhere. I shall prove this point in an example later in this article.

All Black

Quite often people will write or type in a program, RUN it and then find they simply get a black screen. One of the most common mistakes here is that you may not realise that the computer may be giving you an error report, it's

just that you can't see it. A small example will illustrate just what I mean. Type the following into your computer:

```
10 POKE 32768:POKE 32816
20 PRINT "[BLACK] HELLO
WORLD"
```

Line 10 should be replaced with the following if using a CIB, Plus/4 or C128.

```
10 COLOR 0,1:COLOR 4,1
```

Don't forget items in square brackets are mnemonics for Commodore control codes. Read *Designs* if you are not sure about this. [BLACK] means press the CONTROL &1 keys at the same time.

RUN this program and see what happens. The program works OK, you simply can't see the message that is printed since it is printed on a black background with black text. Line 10 simply sets the border and screen to black.

Now this program works without any problems, but what would happen if there was an error in there? Let's add a line to the above example:

```
30 THEN WILL CREATE AN
ERROR
```

As you are no doubt aware this line will cause a SYNTAX ERROR when the program is RUN. Let's RUN it and see. What happened? Nothing seemed to happen, your screen is all black. The error message will be printed out, you simply can't see it as it is in black on a black background. If we change the colour of the text in line 20 then all should become apparent. Change line 20 to:

```
20 PRINT "[WHITE] HELLO
WORLD"
```

Remember what I said about square brackets.

Now RUN the program and you will see the SYNTAX error message appear.

You may think that this is an extremely simple error and that everyone should spot it. It may be simple but is overlooked surprisingly often.

C128 owners have a further problem, the FAST command. For those of you not used to this command it simply turns off the display of the C128 which means that the computers speed will increase. You can still print to the screen, but you can't see what you put on it. So what would happen if the computer came across an error? You would get the same effect as above. The error message will be printed in the screen you just won't be able to see it. As a general rule of thumb, when entering a C128 program omit all FAST statements until you are sure that the program is working correctly. Then put the FAST statement back in.

If you own a C128 then you could try the following program to demonstrate this:

```
10 FAST
20 PRINT "HI THERE!"
30 I'M GOING TO CAUSE AN
ERROR
```

Now RUN the program. The program will print out the message in line 20 and line 30 will generate an error message, you simply can't see it.

Enter the following command on the keyboard. You won't be able to see it so type carefully:

SLOW

Your screen will now come back on and you will see both the "HI THERE!" and the error message.

So if your screen is blank and nothing is happening what should you do?

On a C128 you could first try typing `SHOW` (just in case the computer has been put into fast mode). On other computers, and the C128 if the above fails, try changing the ink colour to see if the cursor reappears, `CONTRN`, and a number will do this. If the cursor does reappear then you know that your program has finished and printed some sort of message on the screen. Find out where the colour of the ink is changed to that of the background within the program, change it to something else and re-run the program. You will now see the message when the program stops.

Illegal What?

Quite often programs will be published that contain a lot of DATA statements. Somewhere within the program this DATA will be READ and the values then POKEd into memory. Your Commodore uses this type of program quite a lot as a way of getting machine code into memory. One of the most common problems that people get with these is that, when the program is RUN, the computer responds with an `ILLEGAL QUANTITY ERROR` in a certain line. If you enter the following example I will show you, as I promised, that the computer is not always right:

```
10 FOR COUNT=0 TO 7
20 READ NUM
30 SUM = SUM + NUM
40 POKE 49152 + COUNT, NUM
50 NEXT COUNT
60 READ CHECK
70 IF NUM<>CHECK THEN PRINT
  "ERROR": STOP
80 PRINT "FINISHED"
90 DATA 10,101,102,103,104,105,106,
  107,102
```

This sort of header is used in Your Commodore every month. Every line has a checksum on the end, the total of the numbers that have been read being worked out in line 30. This is then compared with the checksum, READ in line 60 and compared with SUM in line 70. If they aren't the same then the computer reports the error and STOPs.

Let's RUN this program and see what happens. You should get an error message "ILLEGAL QUANTITY ERROR IN LINE 40". Your immedi-

ate reaction is to check line 40. But there's nothing wrong with this so what is the problem?

An `ILLEGAL QUANTITY ERROR` means that a number has been used that is too large. So let's have a look at line 40. In this line was `POKE 49152 + COUNT` with the number that has been READ from the data statement. The maximum value that `49152 + COUNT` can reach is `49152 + 7` (since the FOR-NEXT loop in the first line) which is 49159. There is nothing wrong with this so what about the number that has been read? You can only POKE a number up to 255 into memory. What must have happened is that you are trying to POKE a number greater than 255 into the computer's memory. If we tell the computer to print this number out when it stops with an error message our lives will be confirmed. RUN the program again and then type the following line when the program stops:

```
PRINT NUM
```

The computer should respond with 732. Hence our illegal quantity error. You can only POKE a number up to 255 into memory, remember? So what has gone wrong? Let's follow the program through.

Line 10 is a loop that repeats eight times, COUNT going through 0,1,2,3,4,5,6 and 7.
Line 20 READs the next number from the data statements.
Line 30 adds this number to the current value of sum.
Line 40 POKEs the value that has been read into memory.
Line 50 goes back round the loop right times.
Line 60 the checksum is read.
Line 70 the sum is compared with the checksum and the program stops if they are not the same.
Line 80 is the end of the program.

So what is our problem? Eight pieces of DATA are read, the sum is then read and the program should read. If you take a close look at line 100 you will see that there are only seven pieces of data and the check sum. This means that instead of the last number being read and POKEd into memory the program READs the checksum and tries to POKE it into memory giving you your illegal quantity error. The number 108 is missing from line 100. In this case the fact that a number was missing from line 100 was easy to spot,

After all we only have one line of DATA in the program. How could you cope if there were 600, 1000 or more lines of DATA? How could you find the line where the DATA was missing?

System Variables

The designers of the Commodore series of computers use certain areas of the computer's memory to hold information about certain things in the computer. The following memory locations hold the line number of the last DATA statement:

83 & 84 on the C64, C16 and Plus/4
85 & 86 on the C128

The line number of the last DATA statement can be found by entering the following line:

```
PRINT PEEK(83) + 256* PEEK(84)
or
PRINT PEEK(85) + 256* PEEK(86)
on the C128
```

Re-Run the above program, when the computer stops with the error message try the PEEK and you will find that the number 108 is printed - the line where the error is. So now you can find where in your program the computer is READING DATA from even if there are thousands of lines.

Correct Version?

Let's correct the above program and see if it works. Re-enter line 100 to read:

```
100 DATA 102,101,103,104,105,106,
  107,108,732
```

RUN the program again and all is well, or is it? The computer comes up with `FINISHED` and no error messages are printed so everything should be OK. Well I'm afraid that it isn't.

Adding Up

The main failing of this type of program is that the check on each line is simply a sum of all of the numbers. Therefore `5+2+1` would give you a checksum of six. However `1+3+1` would also give you six even though the numbers are not in the correct order. If these numbers were part of a machine code program, the fact that they could be in the incorrect order may cause the program not to work correctly or even crash. The golden

B A R E A K

Caption Competition

A cringe filter for the person who creates the funniest comment from Brian Jack's dad. He's the one who's being flung about in a very undignified fashion. Send your entry to Brian Jack's Caption Competition, *Your Commodore*, 1 Golden Square, London W1R 3AB. Closing date: 31 January 1987.

C16 Sound Sampler

It has come to our attention that a number of you are having problems running the C16 Sound Sampler printed in our November 1986 issue.

Two problems have come to light, the first is that people don't understand how the programs work, the other is that it doesn't seem to work on all machines.

If you make the changes below and follow the instructions then you should have no problems using the program.

- 1) LOAD and RUN RELOCATE.
- 2) LOAD SAMPLER PT1 and RUN it.
- 3) When finished, this will SAVE a new program with the name 'SAMPLER' to disk or tape.
- 4) When this is finished turn the machine off and on and then LOAD SAMPLER PT2 and RUN it.
- 5) This will then create a file called SCRN on disk or tape.
- 6) Turn your machine off and on. Now LOAD SAMPLER and RUN it, this will then LOAD SCRN and the program will work.

I hope that this solves all of your problems.

SAMPLER PT2

1000 L-L+5,00-00-0:1FL-146257H0M1200

1400 DAT000,01,02,03,04,05,06,07,08,09,0007

1405 DAT007,02,03,04,05,06,07,08,09,00030

1410 DAT000,07,02,03,04,05,06,07,08,09,00073

1415 DAT005,06,07,08,09,00,01,02,03,04,05,00030

1420 DAT000,06,07,08,09,00,01,02,03,04,05,00030



Winners

There were 25 winners in our News Competition. The top prizewinner is L.M. Vincent from Maidenhead in Kent who will receive a video digitiser and a copy of the News game. The 24 runners up will each receive a copy of the game. Their names are: Andrew Cobb, Yardley; David Ferguson, Clydebank; Verdon Wyn, Gwent; Shane Parry, Aberystwyth; T.J. Williams, Southsea; S.R. Riggs, Huntingdon; D. Locke, Aldenot; John Connolly, Feenhy; Nigel Barker, West Croydon; P. Smith, Sheffield; Adam Wright, Thorpecland; Jonathan Anderson, Newark; Joseph Mahler, London; Nigel Easton, Ovington; Greg McNelly, Taunton; B. Ward, Dordrecht; Brian Carlson, Amsterdam, Netherlands; Tony Moore, Maidenhead; Fergus Peir.

1. You move from corridor to reception.
2. De-code guard to corridor.
3. Secretariat guard to de-code room.
4. You to secretariat.
5. Transmission guard to reception.
6. Encryption guard to transmission room.
7. You to encryption room.
8. Secretariat guard to secretariat room.
9. De-code guard to de-code room.
10. Transmission guard to corridor.
11. Encryption guard to reception.
12. You to transmission room.

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